JUN 20 1918
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TELEPHONE ENGINEER

Volume XIX *CHICAGO, JUNE, 1918* *Number 6*

What of the Future?

If it becomes increasingly difficult to secure operators during the next few years.

If operators' wages increase 25% by 1920.

If you are compelled to increase your number of stations 20%. Which will automatically raise the traffic over your system in still greater proportion.

And if your maintenance and operating costs continue to soar as in the past three years.

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Many operating companies have looked into the future and have solved these problems by installing the automatic.

These companies face the future and the difficulties which it promises, knowing they will be able to render satisfactory service at a profit.

Have you investigated the Automatic from this angle?

It will do for you what it has accomplished for other companies, both large and small.

Refer to pages 8 and 9

AUTOMATIC ELECTRIC COMPANY

CHICAGO, ILL.

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Factory
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A Little Thing, but—
What a Big Surprise!

It is in Convention Room 1725—yes, seventeenth floor—of the La Salle Hotel during the big four days—June 25 to 28.

Button Full Size
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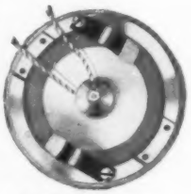
Don't fail to see the Skinderviken Transmitter Button—that wonderful instant repair for faulty transmitters. Test its talking qualities in all positions; note its conveniences and many advantages; observe that its price is only $1.00, with a discount for quantity.



Button Installed on
Transmitter Diaphragm

Examine also the ridiculously cheap and simple Skinderviken Battery Saver.

Inspect the Skinderviken Private Service System—the natural solution of all party line troubles.

And see, by all means, the proof that there is something new even in the telephone business—the Surprise Telephone. The inside will astonish you as much as the outside.

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OSHKOSH MFG. CO.
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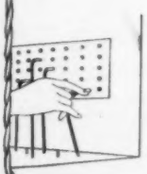
ECCO Dependable Telephone WIRE



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VOL. XIX CHICAGO, JUNE, 1918 NO. 6

The Independents' War Convention

SINCE the United States Independent Telephone Association held its last convention, eighteen months ago, nearly everything has happened that could happen even in that rather protracted period.

The telephone industry perhaps has been no more profoundly affected than many other industries. Comparisons, however, serve no purpose. Telephone operating, for years a long way from simple, has received by intravenous injection a large dose of additional complexity. Independent operators today, and this hour, are confronted by more problems than their most fretful vision could conceive before their previous meeting.

For the reason that the Independents are now more than ever dependent—upon each other; and that there is no operator of Independent telephones who can answer all of his own questions; we anticipate a large and possibly a troubled attendance for the last week in June. That the visitors, however, will hear strong words of counsel and assurance from their representatives who know the trend of things, and that all will go home in an easier frame of mind, we are confident.

That alone is reason enough for every operator to come.

* * *

Entangling Alliances

THIS month's convention coincides with what is practically a crisis in Independent telephony. By this we mean specifically the kind of Independent telephony upon whose activities was founded the right to spell the word with a capital I. We do not mean that the business prospects of Independent operators are threatened in any way.

The Independent telephone business was founded, and thrived and grew, upon the principle of competition and rivalry and even commercial warfare. That is merely a statement of historical fact; it is neither a defense nor a criticism of that principle. This is not the time for vain and academic discussion of the motives that actuated the Independent movement.

If the present condition were caused by less weighty circumstances, we should say that the hitherto free Independent operator was being forced into alliances whose wisdom was doubtful. But the thing that constitutes commercial wisdom has changed from self-interest to national interest. The question now is the most efficient conduct of telephony—not of Independent telephony or of Bell telephony.

The needs of the hour call for universal service. The Bell company, in spite of its boast, in spite of its usurpation of the term, cannot give universal service without Independent help. The only true universal service is a service from Independent to Bell, and from Bell to Independent. A system of universal physical connection would seem capable of taking care of this condition. The Minnesota plan—which doubtless is only one of several to be effected—goes farther than that.

Opinion on the policy of such arrangements as that of Minnesota will be divided between

those who are willing to take extreme steps to increase national efficiency, and those who believe the war can be won without turning established commercial practice wholly upside down. These latter will argue that the Hun front will give way some day, but that commercial alliances put into effect now are likely to hold indefinitely. With a return to peace and the resumption of industry's dominance, the national efficiency will again become subservient to local or community efficiency.

The whole question, then, rests on the relative community efficiency of Bell and Independent operating separately, or Bell and Independent operating together. If it be decided that the old Bell argument is logical and just, and that the telephone needs of the people are served most satisfactorily and most efficiently (not necessarily synonymous terms) by a single nation-wide company—then the Independents may as well prepare to sacrifice their identity.

We cannot see any logic in such a contention. The readiness of an Independent operator to make "entangling alliances" with his commercial opponent, if actuated not by hope of immediate gain but by desire to improve the nation's facilities, may be personally praiseworthy.

But it should be remembered that even our own United States, though it has established "physical connection" with its allies and has arranged to co-operate with them in a wholehearted American way, has entered into none of the entangling alliances against which we were warned by our first President. When the war is over America will again be Independent.

* * *

Our Debt to the Flat Rate System

MERCHANDISING anything is a complicated process. One of the most trite of business philosophies is that sometimes sales may be increased by raising prices. We hear of reputable merchants who, unable to dispose of linen handkerchiefs—for example—at a legitimate price of fifteen cents, deliberately soil and muss up the stock and get rid of it in a hurry as a "Special sale of soiled linen handkerchiefs at the remarkable price of 19 cents each." Every maker of specialties knows that by putting his price high enough to allow his salesmen an attractive commission, he will sell many times the amount possible at a price so low that high-class sales effort was impossible.

Last month we took occasion to express our views on the logic of measured service and the unreasonableness of the flat rate system. The sequel to such a discussion, however, must take cognizance of the fact that logic does not always solve problems, and the most efficient is not necessarily the most attractive.

With all its demonstrable faults, flat rate service—whether it be of water, transportation, food or telephone messages—is always popular. It implies absolute freedom—no restrictions—the sky's the limit—all you can use for ten cents a day. Its appeal to human nature is illogical but irresistible. Who would contract to pay nine cents for two calls when for ten cents he could have—if he ever wanted them—an infinite number of calls?

That, of course, is the more or less conscious reason for a large popular opposition to measured service; that and the suspicion that there may be, in metered messages, a larger and not wholly legitimate profit to the public utility company.

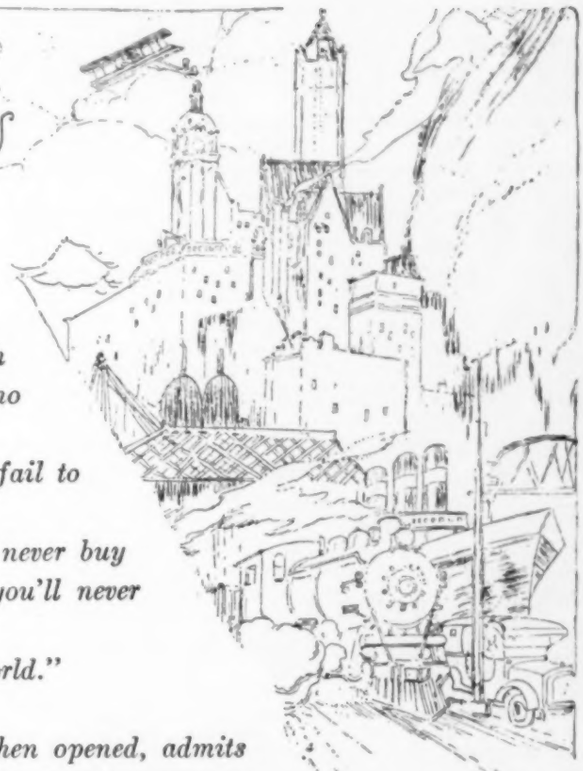
However strongly we may support measured service and condemn the flat rate by academic argument, the development of the telephone to a point of popular necessity owes a large vote of thanks to the flat rate system. In the promotional days it was the convincing argument with its promise of unlimited convenience at no uncertain and problematical price. There would be fewer telephones in the United States today if the spectacular and dramatic period of their development had depended upon the prosaic and wholly unimaginative measured service.

If measured service makes for efficiency, it cannot be denied that the flat rate has made for popularity. And without that accumulation of popularity, of good will toward the telephone service, there would be little occasion to boast of efficiency today.

That is the debt that the telephone industry still owes to the flat rate system.

Imagination

by Leigh Mitchell Hodges



WHEN you go to work tomorrow morning, Young America, leave your tools at home, if you choose, but don't forget your imagination!

At mill, shop or office the boss always can find tools for the man with imagination, but no boss can supply imagination.

You must find it yourself, and if you fail to find it, you find failure.

You can't buy it, but without it you'll never buy much. You can't sell it, but minus its help you'll never succeed beyond a certain point.

Napoleon said "Imagination rules the world."

What is this super-sovereign?

It is the window of the mind which, when opened, admits the leading-light called vision. It is a John-the-Baptist every man must send ahead to prepare the way for better work. A soul scout!

It is the long arm of inner energy, reaching out beyond Today to lay Tomorrow's foundation.

It spells the difference between the blind detail-doer who, from the economic standpoint, dies long before his last breath, and the never-satisfied delver who lives long after he is dead.

Non-thinkers have a notion it is needed only by poets and painters. The FACT is this—imagination is most valuable in practical matters.

With it a machinist becomes a Watt or a Stephenson—without it he remains the village foundryman whose name you can't remember.

A counter salesman with it develops into Marshall Field or John Wanamaker, but without it remains the poor old fellow retained at $10 a week out of sympathy.

With it a Minnesota telegraph operator founds a mail-order business whose net profits last year, after deducting $4,000,000 for war taxes, were $15,000,000.

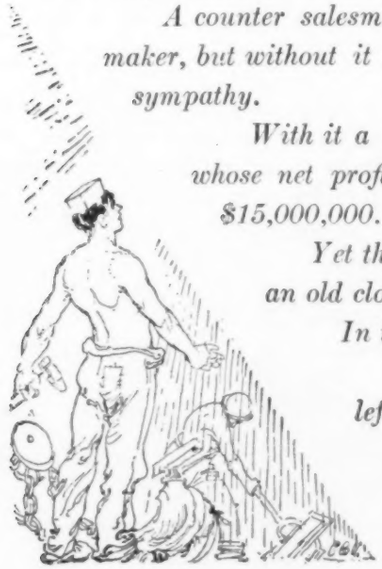
Yet thousands of telegraphers keep on ticking out their lives like an old clock—marking time, but making small use of it.

In this land imagination is needed today as never before.

A million young men who were making good use of it have left their work to fight for freedom.

The million who take their places must cultivate and use it.

Dare to dream!



Court Reverses Michigan Commission

The order of the Michigan Railroad Commission granting rate increases to the Michigan State Telephone Company in the city of Detroit has been vacated in part by decision of Judge Wiest in Ingham circuit court. The effect of the decision will necessitate the establishment of a new rate by another order to be made by the railroad commission.

The decision in brief establishes the following premises: The physical valuation as set down by the railroad commission remains undisturbed; the cost of establishing business is set aside and must be recomputed by the commission on a basis of actual cost instead of a percentage basis; the four party line rate is set aside on the grounds that it is discriminatory and a new rate must be fixed by the commission; the contract with the American Telephone and Telegraph Company must be reduced, and the rate of interest return lowered from eight to seven per cent.

The question of metered service is not included in the decision of the court except in so far as the special rulings may affect it. In determination of the issue raised by the telephone company that the court does not have jurisdiction in the case beyond an inquiry into and an adjudication upon questions properly inhering or pertaining to the exercise of judicial power, the decision says:

> Anything short of an exercise of full power of the court of chancery within the issues up for judicial determination, would not justify the statute nor meet the American idea of the right of judicial review. It is true that this court cannot fix rates, as that is legislative power, delegated in the matter at bar to the railroad commission, but the court has the judicial power, and the very act under which the commission fixed the rates places that power to be invoked by an aggrieved party, to determine whether a given rate prescribed by the commission is unlawful or unreasonable, and this determination involves a consideration of the facts before the commission and upon which it acted.
>
> The extent and nature of the jurisdiction of this court is plain and extends to a review of the action of the commission and in accordance with the facts and the law to affirm, vacate or set aside the order of the commission in whole or in part.

The contention of the telephone company that the rate base established by the railroad commission—reproduction cost new, less depreciation, was valid for that purpose, is upheld by the court's decision, which cites the case of the City and County of Denver vs. Denver Union Water Company, in the United States supreme court, as upholding that theory. Other methods of computing rates bases have not been condemned by the courts but the one at hand has been approved.

With reference to the "going value," or cost of establishing business, the decision says: "When a telephone company seeks to have the cost of establishing its business capitalized into its rate base it must establish such cost by evidence showing not only the nature of the same but the unrequited expense thereof and not leave it to be inferred. If the expense is made known rules of law and equity can be applied.

"In the first instance, the business now being conducted by the company was not established by it but by another company, and the sale on foreclosure to this company did not transfer to this company so as to have it go into the rate base, the cost to the former company of establishing its business. The same can be said of the purchase of competing companies by this company. The intangible value of $835,215 placed in the rate base by the commission is set aside."

The opinion points out that the proposed new rates for four party line line service will cross the two party line rate at the point of 86 calls per month. That this special service was offered to the public as a cheap service to attract subscribers, and has proved so popular as to overload the lines of the company. That the confessed purpose of the company in the proposed new rate is to drive subscribers to accept a better service at a higher flat rate, realizing for the company an additional $120,000 a year.

"This limited flat rate four party service will permit the housewife in the morning," says the court, "to reach the butcher and the baker but stops short of the candlestick-maker until the palm of the company is met with four cents."

The four party rate is declared to be discriminatory and to come within proper jurisdiction for the reason that it is unjust and unreasonable. The court declares the purpose of the new rate is to accomplish what solicitations of the company have failed to do—to drive 10,000 of the present subscribers away from the four party service and pay a higher rate for a reasonable service.

The rate is declared to be unjust and unreasonable, and is set aside. A new rate on the basis fixed by the court will have to be established by the railroad commission.

By contract between the Michigan State Telephone Company and the American Telephone and Telegraph Company the latter receives as a consideration for the use or rental of telephone instruments furnished by it to the local company four and one-half per cent of its gross earnings, and this expense was included by the commission in the total upon which the return the state telephone company should receive was based by the railroad commission. The decision of the court says that the public were not a third party to this contract and continues:

"If the dominant company wants to exact more than this (40 cents per annum per set of instruments) from its subservient company, it is of course at liberty to do so, but its remedy must steer clear of collecting it from the rate payers."

The holding of the commission that this four and one-half per cent per annum is a fixed charge is set aside, and the court directs that the sum to be collected of the rate payers should be 40 cents per set of instruments, including the three per cent in reserve.

The decision also holds that the allowance of 5.6 per cent upon the depreciable fixed capital is too high and should be materially reduced, a limit to be placed on the amount of the fund beyond which its accumulation shall not proceed.

The commission allowed eight per cent as the rate of return, the court fixing seven per cent as a fair rate in consideration of conditions.

Appeal of the Michigan State Telephone Company from the decision of Judge Wiest will be heard in the supreme court in June, if present plans carry, Leo M. Butzel, attorney for the corporation, announced.

"It is the desire of the company and, I suppose, the city to learn as quickly as possible the scope of the law as interpreted by Judge Wiest," said Mr. Butzel. "The court's opinion does not leave the railroad commission much status, making its decision subservient to the opinions of a circuit court. This is a point in which we differ with Judge Wiest and one which must be defined by the higher courts."

"I have the plans made for the telephone lines that Company C will establish in Berlin," writes First Sergeant James L. Daily of Company C, 112th Field Signal Battalion at Camp Sheridan.

The Independent Situation

What Some of the Association Directors Think About It, and What the Convention Will Show

G. W. Robinson.

The United States Independent Telephone Association's

WAR CONVENTION

Chicago, June 25, 26, 27 and 28, 1918, at Hotel La Salle

President G. W. Robinson will address the Convention on the Subject of "The Future of Independent Telephony," and the significance of the Minnesota Plan.

Vice-President F. B. MacKinnon will tell about Independent Telephony as it Looks from Washington.

Increased Rates, from the viewpoint of the Operator, the Public, the State and the Federal Government.

What Independent Telephone Companies Have Done and Can Do to Help Win the War.

The Question of Public Utility Financing.

Technical Sessions.
Open Discussions.
Interesting Exhibits of Apparatus and Equipment on the 17th Floor of the Hotel.

F. B. MacKinnon.

New Methods

By F. B. MACKINNON.

NEW conditions demand new methods. The war has turned upside down the methods used for years by many industries. To what extent has the business procedure of telephone companies "proved out" in this great test? Many have predicted a complete overturning that had but one conclusion, government ownership. While here and there have been flares indicating a sentiment in favor of that result it is apparent the minds of the men in authority at Washington have been working differently. They have come into contact with the telephone industry at two points. They have needed service and have received it. In isolated instances perhaps the service has not been adequate. On the whole the service rendered the nation by the telephone companies has been satisfactory and expressions of appreciation are heard from all sides.

The other point where the federal authorities have come into contact with the telephone industry is in connection with telephone company finances. And here the capable business men, trained to analyze business conditions, who are representing the government financial institutions have quickly and accurately singled out the weakness of the industry in adequate rates. These men have not hesitated to say to municipal and state authorities that this weakness must be cured. These state and municipal regulatory bodies have indicated a desire to do their part. The problem of the Independent group of the telephone industry is to promptly and properly appear for examination, to clearly present the detailed reasons for this need of financial assistance. Here is where the methods of many companies need revision, lack of business rules, too little publicity, inability to tell the story of their lives. New methods are needed. They must be used, immediately.

Stabilizing Itself

By ED. D. GLANDON.

CONDITIONS are not so radically different from what they have been in the immediate past. It may be said, however, that the Independent telephone business is stabilizing itself, and its securities are becoming more in favor from year to year. The tendency of the times is increasingly toward the elimination of ruinous competitive conditions, toward a co-operative relationship. At the present rate of exchange and merger of properties in Illinois, it will be a very short time until competition of any magnitude is eliminated. Public sentiment, the sentiment of leaders in telephone thought, and the policy of the Commission, seem to have fully justified this procedure.

To the end that telephone men be fully rounded in their knowledge of conditions, and be able to cope with the changing situation, no telephone man can afford to stay away from the National convention. Undoubtedly the practice of getting together in district, state and national meetings cannot be neglected without our investments suffering therefrom.

Local Issue

By A. F. ADAMS.

THE telephone situation, to my mind, is a good deal like the tariff—it seems to be a general issue but in reality it is local. The only general issue that exists in

W. H. Bryant.

the public mind, so far as I know, is the more or less general demand for a universal or comprehensive service (not ownership) both local and long distance.

Monopoly

By W. H. Bryant.

IN my opinion, the general situation of the Independent Telephone business is bad. Its present tendencies are to a division of territory with the Bell Telephone interest, and future prospects for Independent Telephony are gloomy, for this movement on the division of territory is being eagerly sought after by both Independent and Bell. Where this has been accomplished there is nothing to prevent, and everything in favor of, the Bell Telephone Company buying what will be, at that time, non-competing properties.

The Bell Company, of course, is not seeking division of territory where it already has the whip hand, and feels that it can crush out, in the course of time, all competition. It is only exchanging territory of such companies as it thinks are so well fortified that that is the only possible solution; and as a tempting bait to the security holders of the Independent properties, it has proven irresistable. Some of our largest properties acquiesced in this movement and seeking to persuade others to do likewise, the result, as before stated, is obvious. It is sad indeed to see an industry that had assumed the magnitude of Independent telephony going down so rapidly. It has however gotten into such shape that I can see no reason to believe that it can or will be stopped. All of these moves, much to my surprise, are meeting with the approval of the Independent Telephone Association, and with the approval of our governmental officials—the latter of whom are charged with safeguarding the interests of the people and must know that the result will, eventually and soon, be a telephone monopoly; and the people whose interests they are supposed to be safeguarding are bound to be the sufferers. The company, or monopoly, owning the system will undoubtedly be better off.

W. R. McCanne.

Much has been said, and no doubt it is Bell propaganda, about there not being the necessity for competition at this time, because of the regulatory bodies who would take care of rates, etc. Rates, perhaps yes, they may be able to regulate in a measure only. But what about the service.....the most important thing after all.....what incentive will there be for the monopoly to serve the people as well under monopolistic conditions as they served under competition? None. The result will be very unsatisfactory service. They will get by with just as little as is possible.

I have always seen this danger, and fought it at every point. I have seen first one then another staunch Independent grab the bait, hook, line and sinker and go down, men who must know that this move will mean the death of Independent telephony.

Competition is the only thing that begets good service, reasonable rates, etc. No regulatory body that was ever created can obtain the result that competition has.

Manufacturing

By W. Roy McCanne.

WHILE regular customers have reduced their buying somewhat, the government's requirements have materially increased with the result that we are working to our full capacity and expect to continue working to our full capacity throughout the remainder of the war period.

Our principal difficulty is securing material and holding our employes. We are not having nearly so much trouble securing material, however, as less essential industries are having. We have advanced our wages more than 50 per cent on the average since the war began, but we still find it difficult to hold our workers.

Like many other manufacturers, we have had to establish special departments for training unskilled workers. We are trying to do our full share of training the workers who have to be brought into industry in this emergency.

Due to increasing costs and the necessity for conserving both material and labor, the tendency toward trades of property has been more pronounced among Independent companies during the past eighteen months than ever before. While these customers now operate in only one-half as many towns as before, they still have as many or more stations than before and are in much better financial shape. If they had any doubts about it before, they now know they are in the telephone business to stay and they are trying to give good service, get good rates and perform their obligations to their community in the best possible way.

The outlook is encouraging—the greatest need right now is to have the operating companies get their rates up to the point where they are sufficient to cover operating expenses and depreciation and to pay a fair return on the investment.

All Michigan Rates to Rise

With an increase in revenue of more than $600,000 and a net loss in the state of $133,000 for 1917, the Michigan State Telephone Company is compelled, according to General Manager G. M. Welsh, to ask for increases in telephone rates in every city and town in Michigan, or a sufficient increase to meet present conditions, which will mean at least $1,500,000.

This information was given to the state tax commission when Mr. Welsh appeared to argue against the state board of assessors' increase of several million dollars in assessed value, meaning an increase to the telephone company of $70,000 a year in taxes.

Interference—Its Legal Status

Read Before the University of Missouri Section, American Institute of Electrical Engineers

BY J. A. WHITLOW

WHEN the casual observer takes notice of the fact that our state legislatures are from year to year grinding out new laws, by the hundreds and thousands, he is likely to wonder why immediate needs in this respect are not, to some extent, satisfied. Instead, the apparent tendency of legislative enactments seems to be to multiply along a line of geometrical progression. Our national legislature is as prolific a source of new laws as any of our state governments, with sessions of Congress growing longer and extra sessions more frequent. Other countries exhibit the same activity, and if we examine our ancient history we find that law-making bodies have from the dawn of history been busily promulgating new rules of action. That this activity is merely the result of other activities and mutations and a necessary accompaniment of progress, is undisputed, since each step forward develops the need of some new rule of action which in turn facilitates still further progress, until at the present time, in spite of the agility of the lawmakers, our greatest complaint is that they are behind the times.

Nowhere has there been more rapid progress resulting in great economic changes and calling for new adjustments in human relations, than in the electrical industry. When Franklin, to use the language of the commencement oration, "snatched the lightning from the clouds," he and his fellow investigators introduced a new world of industry with its universal opportunity for conflict of interests. The problem is particularly complicated on account of the new and invisible forces which in their nature baffle the investigator, although the results they produce are sufficiently tangible and the forces so powerful they are able to produce sudden death to man and beast or to cause great interference with or destruction of property.

One of the interesting as well as one of the most baffling of these electrical forces, is that of induction. Any attempt to explain the nature of this force constitutes another chapter. For our purpose we may say briefly, it is a force which appears to reach out from a current-carrying conductor in such a way as to affect or influence neighboring conductors within its sphere of influence, and no effective commercial barrier against it, except distance, exists. While its exact nature is unknown, we are able now to define the laws of its behavior as completely as the laws of gravity or of some of the other more common forces of nature. Although we are thus able to determine the mathematical laws by which this force is governed, it is affected by so many conditions (such as the characteristics of the design and operation of the electrical equipment) that our ability to predetermine the amount and effect of electrical or magnetic induction is greatly limited. It therefore happens that a conflict of interests often arises in which the opinions of the experts are greatly at variance and equitable adjustment extremely difficult.

It is primarily the intention to discuss herein one of the manifestations of this force of induction—namely, mutual induction between overhead electric power transmission lines and adjacent parallel telephone or telegraph wires. It often happens that the overhead wires of these two systems are built parallel and near each other. In such cases when the power transmission line is carrying an alternating current, the force of induction created thereby affects any neighboring parallel telephone line. There is no mechanical connection between them, but, nevertheless, this invisible force penetrates the intervening space and interferes with the talking circuit of the telephone line. This may happen even if they are separated by the width of the highway or sometimes for a greater distance. A buzzing or snapping noise will be heard in the telephone and often intelligible conversation is impossible. In such cases the telephone service becomes so unsatisfactory that this part of the system will be made non-commercial. In such cases the question immediately arises as to what may be done to eliminate the trouble and who shall pay the cost of making the changes.

The whole electrical industry is comparatively new, and many of these troubles extremely difficult to explain. Furthermore it is contrary to human nature that there should always be perfect agreement when there is a conflict of personal interests involving the payment of money. Consequently the wire using companies very frequently carry their troubles into the courts for equitable decison. Before taking up the investigation of such cases as have been formally decided, attention should be called to one feature which especially affects the central states and causes the legal and economic questions to be complicated more frequently than usually exists in other parts of the United States. The feature to which reference is made is the extreme prevalence of grounded telephone lines.

In some parts of the United States, either on account of the scarcity of the population or the undeveloped condition of the country, the power lines or the telephone lines or both may be absent. In other parts, as in some of the eastern states, as well as in practically all cites, the highly developed and wealthy communities and the prevalence of diversified industries has made it necessary to build and maintain power transmission and telephone systems in close proximity. The demand for uninterrupted service has necessitated close co-operation and has required the type of line construction and operation which will not interfere or be interfered with by other industries. For the power companies this has meant well constructed lines, balanced as to load and free from abnormal conditions, with wires properly transposed with reference to any parallel telephone lines. For the telephone companies it has meant the use in such places of the full metallic system almost exclusively. The metallic system is needed not only in order that transpositions and absence of ground currents may free it from the influence of other lines, but also because only such systems are capable of rendering efficient service free from noise and cross talk induced by other telephone lines.

In certain western states the population is scattered and in some parts the telephone is not as prev-

alent as further east, but as a general rule there the power lines are well built and of high capacity, transmitting hydroelectric power at high voltage for long distances. In such cases the power companies as a rule prefer to obtain and build upon a private right-of-way, and in this way do not so often come in conflict with the telephone lines.

In all the above, conditons are such that little difficulty arises which cannot readily be adjusted without radical changes by either party from the type of construction already in use or contemplated. In the central Mississippi valley states, however, the conditions conducive to interference and conflict are present in an exaggerated way. Here the communities outside the cities are sufficiently developed that there is a general demand in practically all the rural districts for telephone service, and such service is very generally given through the medium of local individuals, small stock companies or mutual companies. Following the general practice where telephone lines have been extended for the first time into rural districts these have been built as grounded lines. Now at a later date the demand for electricity for use by those same rural communities, as well as the economy of serving small towns by transmission lines from other towns, has resulted in the building of electric power transmission lines. These do not carry as high voltage nor are they of as great capacity as in the western states or in the more highly developed eastern section, and it is usually financially impossible for them to support a private right-of-way. They must use the highways and therefore come at once into conflict with the grounded telephone lines.

It is not intended to intimate that this difficulty is typical of the central states alone. Such would be far from the facts as records show this conflict to have occurred in practically all civilized countries. But it happens that as far as this country is concerned, conditions tending to bring these two industries into conflict are particularly prevalent in the central states.

Before attempting a study of the court decisions pertaining to electrical interference, it is necessary to call attention to certain general precepts laid down by the law, which will have bearing on this subject.

I. INCIDENTAL INJURIES TO A SECOND PARTY RESULTING FROM THE LAWFUL USE OF ONE'S PROPERTY.

It is a common and everyday occurrence that a person engaged in the lawful use of his property will interfere with some other person in the lawful use of his property or in the exercise of his natural rights. In fixing liability for such interference the courts have laid down certain conditions that must exist before the injured party is entitled to compensation. One may be conducing his business in the most approved manner, but the nature of that business may be such as to constitute a menace to adjacent property or life, such as the handling of dangerous explosives, or the keeping of some dangerous animal. Great disasters like the Johnstown flood indicate that society has an interest in the use to which private property is put and may even dictate how it shall be managed. A similar condition exists when some action creates a nuisance to the surroundings, or when some business, which is *per se* a nuisance, is located in a neighborhood uncongenial to such an enterprise. Unreasonable interference with the rights of a second party will also be incurred at times, due to carelessness or neglect in the exercise of rights otherwise peaceful and innocuous. The above conditions seemingly cover the ground so well that the legal profession has come to direct its inquiry into the existence of these conditions.

1. The nature of the occupation, whether unusual or dangerous.
2. The existence of a nuisance, *per se*.
3. Whether the offending party has been guilty of negligence.

One of the keynote cases[1] which states these principles with great clearness and to which reference is continually made, is an English case, in which a land owner constructed a dam and impounded a large amount of water on his land. The dam failed, allowing the water to overflow adjacent land, flooding some mines. The court laid down two specific principles:

1. A land owner may put his land to any of its ordinary uses without incurring liability for any mischief incident thereto unless he is guilty of negligence or malice.

2. The land owner who brings upon his land anything which does not naturally come upon it, or which is dangerous in itself, and productive of harm if uncontrolled, is liable for harm done whether negligent or not.

Thus it had long before been established[2] that the owner of a house which cracked because of an excavation made on neighboring property was not entitled to damages, there being no ground for the charge of negligence, unskilfulness or malice. Nearly 100 years later, however, a company constructing a dam[3] was compelled to indemnify the owner of a house that was injured by concussion from explosions of large quantities of dynamite. The court stated that if the means employed will in the nature of things injure or destroy the neighbor's property notwithstanding the highest possible care is employed, the results are as disastrous as if negligence had intervened. In another instance[4] a telephone company endeavored to impose legal obstacles against a street railway company using electro-motive power and placing its wires on the street. The court concluded the question settled in this country that the owner of the land used for an unnatural or extraordinary purpose is "responsible for the consequences of negligence." The fact that the legislature had authorized the use of electricity as the motive power for street railways seemed to establish the right of the latter to use the streets in transmitting the power. A similar result was reached as late as 1910 in another case[5] where the two companies had private right-of-way.

Instances[6] can be multiplied in which the above mentioned principles have carried the superior weight, but as they must be considered also in connection with additional matters of interest, further mention of them is postponed.

II. SUPERIOR RIGHTS.

In the contests for possession of space along the highways, free of interference from other users, the question of who possesses the superior right has turned

[1] *Rylands vs. Fletcher*, (1838) *L. R.* 3 *H. C. L.* 330.
[2] *Panton vs. Holland*, 17 *Johns* (*N. Y.* 92-99), 1818.
[3] *Watson vs. Miss. Power Co.*, 156 *N. W.* 188, 1916.
[4] *National Tel. Co. vs. Baker*, 68 *The Law Times Reports* 283, (*L. R.* 1893).
[5] *Lake Shore & M. S. Ry. Co. vs. Chicago L. S. & S. P. Ry. Co.*, 92 *N. E. Rep.* 989 (1910).
[6] *Cumberland Etc. Co. vs. United Elec. Co.*, 42 *Fed.* 273.
Postal T. & C. Co. vs. Chicago L. S. & S. B. Ry. Co., 97 *N. E. Rep.* 20.
Citizens Tel. Co. vs. Ft. Wayne & S. Ry. Co., 100 *N. E.* 309.

up on two points. A. Superiority arising from the nature of the business, or use to which the line is put; B. Superiority arising from priority of occupancy.

A. *Superiority from Use.* This brings up the question as to which of the three wire using industries—street railway, electric light, and telephone (or telegraph)—is entitled, from the nature of its calling, to the greatest consideration.

1. Since the streets and highways are constructed to facilitate travel, it naturally follows that franchises granted street railways are in accord with the purposes for which the streets are created and street railways therefore are no additional burden upon the highway. Such is not the case with the telephone or telegraph, however. Their occupancy of the highways is clearly an additional burden, and their franchises usually contain the provision that their wires and poles shall be so placed and maintained as not to interfere with public travel. One opinion holds that the telephone franchise is "subordinate in all respects to public travel" and the grantee could not complain of injuries received from overflowing current. This court made no distinctions between injuries resulting from conduction and induction, allowing the telephone company no right of action in either case.[7] As a general rule the courts give more consideration to the telephone company; notably a Tennessee case[8] in which the telephone company was allowed the cost of installing the McCluer device to prevent interference through overflowing ground currents, but was denied any recovery for interference through induction. In one of the very earliest instances the Telephone Company sought to enjoin the Street Railway Company[9] which had a franchise to operate horse cars, from using electricity as motive power. The injunction was denied and the superior position of the Railway Company upon the public highway was affirmed. It was held that interference with the telephone lines by induction from the street railway lines was not actionable. The court compared the position of the telephone company to that of a railroad when another railway desires a crossing, declaring that "a railway company across whose track a right-of-way was condemned could not recover for an injury to its franchise as a railroad; and that the detention of trains, loss of future business of additional expenses incident to the future exercise of its corporate powers could not be taken into account in estimating consequential damages."

2. The firm position occupied by the Street Railway Company's lines due to its calling as a public carrier is not enjoyed by the electric light companies' lines. The trend of opinion has shown the telephone and electric light to be of equal necessity and since their wires may be adjusted so that both can use the highway, neither is given the exclusive use of more space than safety requires.[10]

B. *Superiority Derived from Priority of Occupancy.*

1. Ordinarily the company first upon the street or highway will be protected from unreasonable interference. What constitutes unreasonable interference is naturally the subject of a wide difference of opinion. This discussion will attempt to interpret the feeling of the courts in this subject. For the present it may be said that any interference is unreasonable when the newcomer tries to appropriate the space already occupied by the older concern. The company having prior possession will be protected in the use of a reasonable space,[11] nor will the second company be allowed to place its wires so close as to constitute a dangerous menace to life or property[12] or to needlessly interfere with the successful operation of the prior occupant. Not only shall the electric light company not interfere unnecessarily with a telephone company[13] but with another light company,[14] nor a telephone company with another telephone company.[15] Although the street railway is superior to the electric light or telephone company in its right to use the streets, it also may not needlessly interfere with either of the others but must observe due caution in building upon a street occupied by another interest.[16] It should be particularly noted here that the interference enjoined of the newcomer in the above discussion of unreasonable interference is unnecessary or needless interference. The cases cited indicate that the late comer may be compelled to build at a safe clearance or even to occupy the opposite side of a street, but no attempt is made at this point to discuss that interference which is unavoidable so long as each company enjoys its franchise; that is, interference which cannot be prevented so long as both companies are upon the same street, even though on opposite sides.

It is one question to decide if both companies can operate successfully by not unreasonably interfering with one another upon the same street, but it is quite a different matter if one cannot operate at all or very unsatisfactorily when another company builds upon the same street. This latter question will have full consideration in subsequent paragraphs.

2. Although the prior occupant will be protected against unreasonable interference it does not follow that it has exclusive right to the highway upon which it builds or even to that side which it has occupied. It cannot claim more space "than is reasonably sufficient for the safe and successful operation of its works."[17] Where such conflict exists, equity will adjust such conflict of interests if possible so that each company may exercise its own franchise as fully as compatible

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[7] *Hudson River Tel. Co. vs. Watervliet Turnpike & R. Co.*, 17 *L. R. A.* 674 (1892).

[8] *Cumberland Tel. & Tel Co. vs. United Electric R. Co.*, 93 *Tenn.* 492, 27 *L. R. A.* 236 (1894).

[9] *Cincinnati Inclined Plane Ry. Co. vs. City & Suburban Telephone Assn.*, 48 *Ohio St.* 390, 12 *L. R. A.* 534 (1891).

[10] *Western U. T. Co. vs. Los Angeles E. Co.*, 76 *Fed.* 178 (1896).

Bell Tel. Co. vs. Belleville Elec. Lt. Co., 2 *Am. Elec. Cases* 330 (1886).

[11] *Northern Tel. Co. vs. Iowa Tel. Co.*, 98 *N. W.* 113.

Paris Elec. L. & Ry. Co. vs. Southwestern T. & T. Co., 27 *S. W.* 902.

[12] *Bell Tel. Co. vs. Belleville Elec. Lt. Co.*, 2 *Am. Cases* 330.

Rutland Elec. Lt. Co. vs. Marble City E. L. Co., 65 *Vt.* 337, 20 *L. R. A.* 821.

[13] *Bell Tel. Co. vs. Belleville Elec. Lt. Co.*, 2 *Am. Elec. Cases* 330 (1886).

Paris Elec. L. & Ry. Co. vs. Southwestern T. & T. Co., 27 *S. W.* 902 (1894).

Western Union Tel. Co. vs Los Angeles Elec Co., 76 *Fed.* 178 (1896).

[14] *Edison Elec. Illum. Co. vs. Citizens Elec Co.*, 235 *Pa.* 492, 84 *Atl.* 438.

Consolidated Elec. Co. vs. Peoples Elec. Lt. & Gas Co., 94 *Ala.* 372, 10 *So.* 440.

Rutland E. L. Co. vs. Marble City E. L. Co., 65 *Vt.* 337, 20 *L. R. A.* 821.

[15] *Northern Telephone Co. vs. Iowa Telephone Co.*, 98 *N. W.* 113 (1904).

Louisville Home Tel. Co. vs. Cumberland T. & T. Co., 111 *Fed.* 663 (1901).

[16] *Cumberland T. & T. Co. vs. United Elec. R. Co.*, 93 *Tenn.* 492, 27 *L. R. A.* 236 (1894).

with the necessary exercise of the other[18] and will enjoin all interference not strictly unavoidable.[19] The first occupant shall enjoy the use of a reasonable space and be protected from unnecessary injury but does not have exclusive possession. It may occupy only a reasonable space and even be subject to some inconvenience by the coming of the second company,[20] although if the two cannot operate with safety on the same side the second company may be forced to move to the opposite side.

III. WHAT IS UNREASONABE INTERFERENCE.

It has been shown that a wire company whose lines are located upon the highway in pursuance of a franchise lawfully granted it, will be protected from unreasonable interference. Aside from injuries of an incidental and miscellaneous nature, the interference referred to is of two general kinds. One may be called a physical interference, that is, interference by contact or close proximity, and the second is that more intangible but equally real interference known to the engineer as mutual induction.

A. *Interference by Contact or Conduction.* 1. This, again, may assume several forms, the simplest of which is the physical conflict of equipments. One of the first laws of nature declares that two bodies may not occupy the same space at the same time. It is possible, however, and by no means unusual, for one company to build in gross disregard of another company already upon the highway, building near, through, over or directly against the first company's poles or wires. This is not likely to happen unless the intruder has a stronger current or system and the prior occupant cannot protect itself by opposing a stronger force than presented by the invader. In such cases the courts offer ample protection to the offended party. It may be that the second company can build on the opposite side of the street, or if not it can overbuild with a safe clearance. Since direct physical interference is, except in the most unusual cases, preventable, it is therefore unnecessary. Hence it was declared that equity would so adjust the interests that both could make use of the highway. (See 18.) The doctrine of negligence (Sec. 1) enters strongly into the consideration of the case but if, with the best of construction, interference and limitation of one or the other are unavoidable, the last to occupy the field must give way.[22] The courts frequently give utterance to the principle of *"Sic Utere Tuo , ut alienum non laedas,*[23] and this is so well understood now that we find the users working in mutual agreement, even to the extent of placing their lines on the same poles, the rental or exchange of "pin space" being now a recognized necessity in communities where the wire using companies have congested the streets.

The most frequent complainants against unreasonable intrusion are the telephone companies who, because of the weak current, low voltage and delicate instruments employed by them, are easily affected by any encroachment and are unable to offer effective resistance. Electric light and power companies, with their "more robust currents" may, and often do, invade the field occupied by the telephone companies. The latter have fought back nobly and effectively, the most frequent client of the legal profession in this respect being the great Bell system and its subsidiary companies. Some instances are worthy of discussion.

At Paris, Texas,[24] both companies held franchises from the city to erect poles and string wires along the street. The telephone company's franchise was superior in point of time to that of the light company and had exercised its rights prior to the erection of the light company's poles and wires. The court held that the latter "could not interfere with the use and enjoyment of that privilege by stringing wires in such close proximity * * * * as to impair the efficiency of appellee's telephone service." The evidence was that wires were strung nearer than 4 feet, "which created danger of fires and of injury to persons and danger to human life." The injunction in favor of the appellee was upheld. By way of showing this to have been a preventable case, it was undisputed that there was room on the street for the appellant to build its lines more than 4 feet away.

In Canada an injunction was also granted the Bell Telephone Company against a light company,[25] where it was held that although plaintiff was in possession of the ground and had its poles erected before the defendant, that did not give it exclusive possession or exclusive right to the side of the road on which it had placed its poles, but that being first on the ground it had the right to be protected against any interference or act to its injury. It was further held that there was danger in the position of the wires, that the defendants were wrong-doers, and they were ordered to transfer their wires to the opposite side of the street.

A like injunction was granted in Missouri.[26] In this case the light company was not required to move to the opposite side of the street, but was restrained from placing its wires nearer than 8 feet vertically from the telegraph wires.

In another instance one telephone company appealed from an interlocutory injunction granted another telephone company[27] by a circuit court which had held that on account of priority in occupation of the space the complainant was entitled to the exclusive right to a space 8 feet wide and 25 feet high. It was conceded that on account of such priority the complainant was entitled to the continued enjoyment of the space without substantial impairment but was not entitled to a monopoly, particularly as the city had reserved the right to grant a second franchise. The building of the second company's lines entailed some inconvenience to the first, but the testimony of the experts showed that the over-building of one company's lines by another was common practice and, if properly done, entailed no serious inconvenience, particularly if both were telephone systems.

It has been necessary for a light company to ask

[18] *Edison E. L. vs. Merchants Etc. Co.*, 200 *Pa. St.* 209 (1901).
[19] *Ibid. Edison Elec. Illum. Co. vs. Citizens Elec. Co.*, 235 *Pa.*, 492, 84 *Atl.* 438.
[20] *Louisville Home Tel. Co. vs. Cumberland T. & T. Co.*, 111 *Fed.* 663 (1901).
[21] *Bell Tel. Co. vs. Belleville Elec. Lt. Co.*, 2 *Am. Elec. Cases* 330.
[22] *Edison E. L. Etc. Co. vs. Merchants Etc. Co.*, 200 *Pa. St.* 209.
[23] *Cumberland T. & T. Co. vs. United Elec. Ry. Co.*, 42 *Fed.* 273 (1890).
[24] *Consolidated Elec. Lt. Co. vs. Peoples E. L. & Gas Co.*, 94 *Ala.* 372, 10 *So.* 440.
[25] *Paris E. L. & R. Co. vs. Southwestern T. & T. Co.*, 27 *S.W.* 902 (1894).
[26] *Bell Telephone Co. vs. Belleville Elec. Lt. Co.*, 2 *Am. Elec. Cases* 330 (1885), 12 *Ontario Reports* 571.
[27] *Western Union Teleg. Co. vs. Guernsey & Scudder Light Co.*, 46 *Mo. App.* 120 (1891).
[28] *Louisville Home Telephone Co. vs. Cumberland T. & T. Co.*, 111 *Fed.* 663 (1901).

the courts to impose a barrier against another light company[28] because of damage suffered in consequence of its wires coming in contact with those of the later company and because its men could not safely reach its wires for making repairs or connecting to buildings. In another dispute between two light companies[29] it was testified that at eleven different places the poles, wires and cross-arms of the defendant were in contact with the plaintiff's wires and at fourteen places defendant's wires and cross-arms were from 1 inch to 14 inches from wires of plaintiff. The court said, "We are fully convinced that a clearance of not less than 24 inches should be maintained. * * * * Equity will enjoin all interference not strictly unavoidable.

Even the street railway company, with its superior right to use the street, may not build in such a way as to interfere unreasonably or needlessly with the prior rights of a telephone company. It must so erect its poles as not to create a physical interference[30] unless the telephone lines were themselves built too low or in a negligible manner.[31]

There have been some interference cases of this kind before the public service commissions. One is contained in a decision of the Vermont Public Service Commission.[32] There were two telephone companies which at some places were on opposite sides of the road. It was ordered that the 22,000-volt lines should in no case parallel the telephone lines at a separation of less than 15 feet. The power company should move the telephone company's lines where necessary to place them on the same side of the road and the telephone companies in future should jointly occupy the one side. The telephone company was required to provide the material to make the change, and wherever it had been moved it should pay the other telephone company pin rental. Where found necessary to move either both telephone lines or its own line, the power company was given its choice, and in such cases also the telephone companies were required to furnish any material needed to make the change. This change was made to secure a safe clearance and was in accordance with an understanding between the parties, hence is hardly a working basis.

The Supreme Court of Vermont upheld an order of the Public Service Commission[33] of that state requiring the Burlington Traction Company to move its 22,000-volt line a safe distance from the lines of the Western Union Telegraph Company, which was of prior construction. Both had private rights-of-way, but the Commission had found that at places the power line had been built with not over two feet horizontal separation from the telegraph wires, and "that the construction and location of the high-tension line with respect to the telegraph line violates approved practice." * * *

Before taking up a different kind of interference by conduction, attention is again directed to the fact that in all the above cases the interference could be avoided by the newcomer simply observing a reasonable clearance. It is not stated that equity would enjoin against interference that was unavoidable.

2. A second form of interference by conduction is that form which arises from the use of each of the companies of the earth for the return circuit. In 1890 in the first Cumberland Tel. & Tel. vs. United Electric Railways Co. case,[34] the telephone company sought to enjoin the railway company from using the earth as a common return, and against induction by requiring the railway company to use a double trolley. The injunction was denied chiefly on the principles laid down by the Panton vs. Holland case, and were re-stated by this court as follows:

1. That the defendants are making lawful use of the franchise conferred upon them by the state in the manner contemplated by the statute, and that such act cannot be considered a nuisance in itself.

2. That in the exercise of such franchise no negligence has been shown and that no wanton or unnecessary disregard of the rights of the complainant.

3. That the damages occasioned to the complainant are not the direct consequence of the construction of the defendant's roads, but are incidental damages resulting from their operation, and are not recoverable.

This court did not discuss the superior right of the street railway company but simply held that since the telephone company had the easier and cheaper way of obviating the trouble, it was its duty to do so.

In each of the two following years the telephone companies haled the street railway companies before the courts. In New York[35] they were denied an injunction against the railway company using electric motive power, which produced conductive and inductive interference. Here the court held that priority gave no supreme right and that the use of the street by the telephone company was subordinate to the right of the railway company. Therefore, it could not complain of injuries received from overflowing currents. This court also stated that no distinction could be made between the injuries resulting from induction and conduction.

The Canadian courts are in accord with the principles established in the above case.[36] A similar condition prevails in South Africa,[37] where a cable company found it necessary to lay a twin core cable for several miles out into the ocean to neutralize interference from ground currents of a tramway. The court denied the cable company damages, holding that the case demonstrated the fact that the escaping electricity did not generally destroy telephonic service, but only affected instruments made in a certain way. It held that the principle of Rylands vs. Fletcher "does not apply to the case of injury done by minute currents of the escaping force to a peculiar trade apparatus unnecessarily so constructed."

The Ohio Supreme Court[38] reversed an action of a lower court which at the behest of a telephone company had enjoined a street railway company from operating its cars by electricity. It stated that franchises were granted telephone companies for public service

[28] *Rutland E. L. Co. vs. Marble City E. L. Co.*, 65 *Vt.* 337, 20 *L. R. A.* 821.

[29] *Edison Elec. Illum. Co. vs. Citizens Elec. Co.*, 235 *Pa.* 492, 84 *Atl.* 438.

[30] *Cumberland T. & T. Co. vs. United Elec. Ry. Co.*, 93 *Tenn.* 492, 27 *L. R. A.* 236.

[31] *Central Penn. Tel. & Sup. Co. vs. Wilksebarre & Westside Ry Co.*, 11 *Pa. Co. Ct. R.* 417.

[32] *Orange County Tel. Co. vs. Royalton Power Co. et al.*, 13 *Bien. Rept. Vt. Pub. Serv. Com'n* 195, 4 *Am. Tel. Cases* 235.

[33] *Western Union Teleg. Co. vs. Burlington Traction Co.*, *P. U. R.* 1916-*C* 245; 99 *Atl.* 4.

[34] *Cumberland T. & T. Co. vs. United Electric R. Co.*, 42 *Fed.* 273.

[35] *Hudson River Tel. Co. vs. Watervliet Turnpike & R. Co.*, 17 *L. R. A.* 674 (1892).

[36] *Bell Telephone Co. of Canada vs. Montreal St. Ry. Co.*, *Vol.* 10 *Quebec O. L. R., Sup. Ct.* 162 (1895).

[37] *Eastern & South African Telegraph Co. vs. Cape Town Tramway Co.*, *L. R. App. Cas.* (1903) 381.

[38] *Cincinnati Inclined Plane Ry. Co. vs. City & Suburban Tel. Assn.*, 48 *Ohio St.* 390, 12 *L. R. A.* 534 (1891).

and a public benefit and not for mere pecuniary gain, and the exercise of the franchise is subordinate to the accommodation of those who travel on the streets and highways. The courts further cited the case of the Lake Shore & M. S. Ry. Co. vs. Cincinnati S. R. Co., 30 Ohio St. 604, in which the court held that "a railway company across whose track a right-of-way was condemned could not recover for an injury to its franchise as a railroad; and the detention of trains, loss of future business, or additional expenses incurred incident to the future exercise of its corporate powers, could not be taken into account in estimating consequential damages."

Four years after the first Cumberland Telephone case at Nashville we find the same parties again contesting.[39] This time the telephone company sought to collect damages for: First, injury, resulting from leakage or conduction. The ground currents of the railway company had spread to the telephone cables and wires, even affecting the instruments and, it was claimed, substantially destroyed the utility of the telephone plant. Second, injury resulting from "induction" or "parallelism." Third, for the cost of putting in higher poles to clear, sufficiently, poles and wire erected by the railway company in such a way as to conflict with the existing telephone wires. The loss sustained in guarding against induction was denied, but full compensation was allowed for installing the McCluer device to obviate trouble due to overflowing ground currents and for alterations to secure a safe clearance. It was made clear that the ground currents of the railway company were not confined to the street but overflowed upon adjacent private property, as far as one-half mile on either side, following the cables into the telephone station and interfering with the operation of the switchboard. Because of this trespass on private property the damage was allowed. This is one of the most important and most quoted cases of conflicting electrical interests. The principles laid down have been thus summarized by Deiser.[40]

1. The operation of a street railway in the street with any incidental inconvenience or damage to objects in the street, is a legitimate use of the streets within the purpose of their original dedication, but

(*a*) This principle does not extend to property rights outside the streets.

2. Both telephone and railway companies must exercise their powers with a careful and prudent regard for the other's rights.

4. If the "ordinary use" of a railway franchise be such as to injure the telephone franchise unnecessarily, the cost of any change necessitated must fall upon the street railway.

5. The railway company is not liable for injuries to the lines of the telephone company on the same streets, due to induction, or conduction.

6. The railway company is liable for damages inflicted upon the telephone exchange located upon private property outside of the streets, by conduction.

7. If the telephone company can protect its lines by the adoption of the McCluer device, (a large copper wire, attached at both ends to the out-going (from its exchange) telephone wires), the cheapest effective remedy for injury by conduction, and capable of being applied alone by the telephone company, it is the right and duty of the telephone company to resort to the device, and it may recover the cost of installing it from the railway company.

It at first appears that this decision was directly contrary to the precedent established by the first Nashville case and by the New York and Ohio courts in the two instances last mentioned. However, this court called attention to the fact that those were injunction suits threatening the very life of the street railway and the future of transportation, while this case merely awards payment for damages incurred off the highway through faulty construction and operation.

(To be continued.)

[39] *Cumberland T. & T. Co. vs. United Elec. R. Co.*, 93 *Tenn.* 492 (1894), 27 *L. R. A.* 236.

[40] *Law of Conflicting Uses of Electricity and Electrolysis, Deiser, pp.* 81-2.

New Toll Lines in Georgia

Over six hundred miles of toll wire is now being added to the long distance talking equipment out of Valdosta, Ga., by the Bell Telephone Company in the way of new circuits radiating from this city in several directions.

Several gangs of men are already at work on the construction of these new lines, the work all being directed from Valdosta as the central point for construction, under the direction of J. G. McKoin, general foreman, whose headquarters have been in Thomasville for some time past, but will be in Valdosta during the construction period, which will cover several months.

A new circuit is being constructed from that city to Jacksonville, and when it is completed this will give the people two lines to the Florida city. Heretofore Valdosta has talked generally with Jacksonville over a circuit through Waycross, but the new circuit will go more direct, and through Lake City.

Another new connection will be on a new circuit being built through from Waycross to Thomasville, which will give Valdosta a new Atlanta connection through Thomasville, Albany and Americus. At present Valdosta talks to Atlanta through Waycross. Another new circuit will go north as far as Tifton.

In this construction work there will be 631 miles of new copper wire used, with 51 miles of iron wire, besides all of the other new material which is necessary for the construction of a telephone circuit.

This new work will cost many thousands of dollars and take considerable time. When it is completed Valdosta will be in a position to get all kinds of connections for long distance talking with the outside world and no city in the state will have a better arranged system of toll wires.

Holdoegel Buys Sac City Plant

P. C. Holdoegel of Rockwell City, Iowa, has closed negotiations for the purchase of the Elwood Telephone company of Sac City from Judge S. M. Elwood. Consideration involved in the deal is reported to be about $40,000.

Senator Holdoegel states that a new organization will be formed to operate the Sac City company. The purchase was made subject to the acceptance of a new franchise by Sac City. The Sac City council accepted the proposed franchise and referred the proposition to the voters at a special election to be held June 24. It is expected that the franchise will be adopted without question.

"The council voted to accept the new franchise to begin on the present scale and continue with it as long as a reasonable return could be made thereby," says the *Sac Bulletin*. "The council reposes much confidence in the new owner and the local telephone company and expects to see duplicated here the service and unification policy carried out in Calhoun county."

George Ross of Waterloo, an experienced telephone man, has been secured as manager of the new Sac City company.

A Plan that Saves 25% on Office Wages

An Efficiency Article Presented Through the Courtesy of "System," The Magazine of Business

BY H. O. KENT*

WHEN going over the payroll just before giving your office force their periodical raises, do you pause at a name here and there and say to yourself: "Miss Arms—well, I guess she has earned a raise—been here two years now and seems to work hard. A little addition to her weekly check would encourage her." Or perhaps you stop longer at Miss Evers' name and hesitate, "She doesn't seem to have much ambition. I wonder how she could be spurred on."

If your system is that of many offices—and the one that prevailed with us, too, before we worked out our present method—you may find it difficult at times to judge accurately the relative merits of your office workers.

Although this method was first installed primarily for the purpose of stabilizing our clerical labor, even greater advantage has resulted in enabling us to see at a glance, over a sheet or two of summaries, the actual comparative worth to us of each of our stenographers, typists, and dictating machine operators.

Briefly stated, this is a bonus payment plan based on an actual quantity and quality measurement of work done.

When we decided to try out some such plan in one of our departments, we thought it best to prepare the ground thoroughly. We did not want to waste effort, time and money in too much experimenting, and so we went at the problem with a view to preparing everything that might affect its successful carrying out under the most favorable conditions.

WHY WE FELT WE MUST FIRST STANDARDIZE

We realized early, for one thing, that before installing bonus systems based on comparative amounts of work for groups of workers similarly employed, it would be necessary to standardize as far as possible all equipment, details and methods before a fairly apportioned task could be set for any given length of time.

The first thing for us to go after, then, was the physical arrangement of the desks and chairs of the operators. These with us were already quite satisfactory. A table had been standardized which occupies the least floor space consistent with adequate provision for working materials, while the standard chair is one on which the height of the seat, height of the back support, and the angle between the seat and the back can be regulated. The back is pushed forward by a spring and thereby offers support to one sitting erect. When this chair is used with the foot bar, which we also think is necessary for ease and speed in working, the operator can keep a correct position with comfort throughout the day.

Detachable racks and cabinets suitable to the particular kind of work for which they are used have been designed and are being installed as rapidly as possible; later on, therefore, we hope to be able to show even better results than those we are telling about in this article.

HOW WE HELP THE WORKERS INCREASE THEIR OUTPUT

We also taught the stenographers, typists and operators how they could most economically handle their stationery to consume the least possible time in placing it in the machines. We reasoned that haphazard ways of performing these operations would be a source of considerable variation—in the long run—in the operator's bonus; but if she were taught the easiest and quickest way in which to make each movement, she would in the end be able to accomplish just so much more.

Here, for instance, are a few directions from the set of instructions worked out—each of them is now fully explained to the new worker:

"When you make your pick up of letter head and manila paper, reach over to the cabinet but once and bring away all papers with the left hand. While picking up these papers in the left hand take up the carbons in the right hand and bring all papers together at the left of the machine. Place the carbons as nearly in the correct position as you can with one movement of the hand for each carbon.

"Place envelopes in the pigeonhole face up and flaps turned away from the machine, turn the wrist as you carry them to the typewriter, and they will be in the proper position to insert.

"Tie your eraser to the typewriter on the side of the stronger hand. Three

TO HELP THEM WORK BETTER

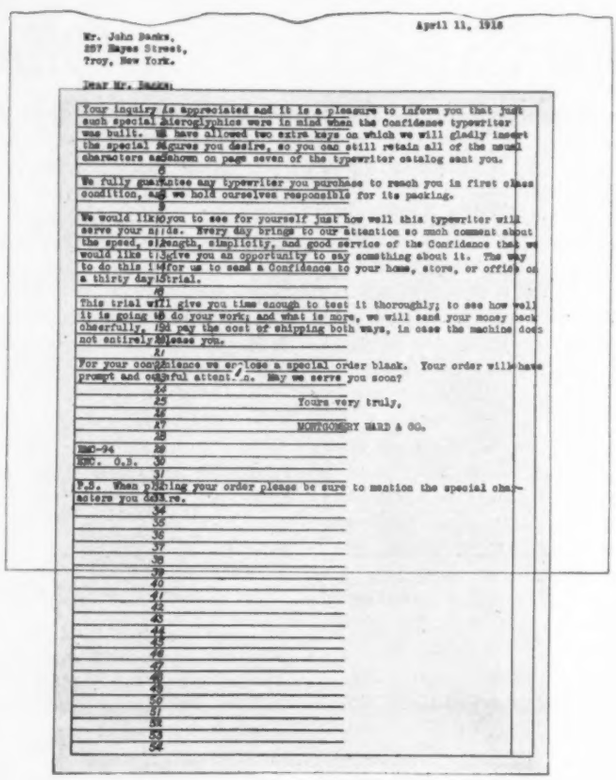
These tables are specially built for the stenographers. They occupy little floor space, and offer the greatest convenience to operators. The chairs can be regulated to fit individuals.

*The methods described in this article have been worked out under Mr. Kent's direction, in the efficiency department of Montgomery Ward and Company.

or four rubber bands linked together are better than a string."

The last rule, though perhaps a seeming trifle, becomes really quite significant when you multiply the time consumed in the search for the eraser by the number of times a day the search is made and by the number of girls. A low estimate is one erasure for each letter, one-sixth of a minute to find the eraser each time, 100 letters a day, or an actual loss of about 15 minutes a day for each worker for this simple cause.

It was our desire to base payment as nearly as possible on the actual output of the persons affected, and so the foundation of the system had to be an accurate method of measuring the output. The square-inch method of measurement—that which measures areas of typewritten matter—we found would not give the accuracy we required. One of its deficiencies, for example, is that it does not make allowances, without extra figuring, for paragraph spacing, which varies considerably with different correspondents. One operator, transcribing the letters of a man given to frequent paragraphing could gain an undeserved increase in bonus over other operators.



April 11, 1916

Mr. John Banks,
257 Hayes Street,
Troy, New York.

Dear Mr. Banks:

Your inquiry is appreciated and it is a pleasure to inform you that just such special hieroglyphics were in mind when the Confidence typewriter was built. We have allowed two extra keys on which we will gladly insert the special figures you desire, so you can still retain all of the usual characters as shown on page seven of the typewriter catalog sent you.

We fully guarantee any typewriter you purchase to reach you in first class condition, and we hold ourselves responsible for its packing.

We would like you to see for yourself just how well this typewriter will serve your needs. Every day brings to our attention so much comment about the speed, strength, simplicity, and good service of the Confidence that we would like to give you an opportunity to say something about it. The way to do this is for us to send a Confidence to your home, store, or office on a thirty day trial.

This trial will give you time enough to test it thoroughly; to see how well it is going to do your work; and what is more, we will send your money back cheerfully, and pay the cost of shipping both ways, in case the machine does not entirely please you.

For your convenience we enclose a special order blank. Your order will have prompt and careful attention. May we serve you soon?

Yours very truly,

MONTGOMERY WARD & Co.

MMC-94
ENC. O.B.

P.S. When placing your order please be sure to mention the special characters you desire.

HOW PRODUCTION IS MEASURED

Transparent celluloid rectangles like this are used to measure the amount of work of each stenographer and typist. The number of full lines is the basis for the bonus.

Therefore, we made our unit of measurement the line with a standard length of six inches. The margin bell was set to ring just before the full length of the line had been reached by the girl.

OUR PLAN FOR MEASURING EACH WORKER'S PRODUCTION

For measuring letter length all that was needed, then was a scale which would give us the number of full-length lines. Two scales, transparent celluloid rectangles 6½ inches wide and 9½ inches long, were worked out to take care of the different spacing between the lines on the two makes of typewriters we had standardized on. An illustration on page 899 shows one of these scales placed over a letter. The vertical lines at the right are to guide the measurer in seeing at a glance that the standard length line is written.

The work is measured by observing the total number of lines in the body of a letter as shown by this scale and noting on the record sheet with the number of paragraphs. There is a double spacing between paragraphs and under the law of averages we find that the average of the end lines for the day equals a half line. Therefore, the equivalent of 1½ lines for each paragraph in the letter is deducted from the total number of lines.

There are also a number of what we call "recurring factors" in each letter, such as the time to take up and insert the paper in the machine and to type the name, address, date, salutation, closing, and the initials of the correspondent and typist. By time study these were determined in this particular division to be the equivalent of five line-units. This varies slightly in different departments according to the nature of the work. At the end of the day the number of line units of work accomplished by each operator is obtained by the total number of lines measured, less 1½ times each paragraph, plus five times the number of letters written. Special allowances are also made for special kinds of work.

So much for the plans that have to do with the actual computation of output. Our next consideration was the reward. Careful time studies showed that an output of 150 lines an hour was a fair task. By this is meant that a reasonably good operator can produce under standard conditions and without undue effort for a period of eight or nine hours a day this amount of work, and that she can increase this amount by at least 100 per cent as she becomes more proficient in her work and more nearly an expert operator.

The proper salary to pay for this standard output was determined by analysis of comparative wages on similar work in other industries, as it is our desire always to pay at least a little better than the market demands with the bonus earnings as an entirely supplemental reward.

MAKING THE RATES FAIR FOR EVERYBODY

In addition to experienced operators, we employ beginners who have just graduated from school and others with but little experience. To give all of them the proper incentive to improve their work, the scale was graded several steps below the standard, so that these beginners would still have the incentive of the bonus.

Figuring from the standard we determine 90 lines an hour as the proper output for a beginner and graded the output for each $1 increase in salary as is shown by the scale below. "X" is used to indicate the beginner's salary and "Y," which is $6 a week or more, is the standard salary:

Over 150 lines an hour	$Y	and bonus
Over 140 lines an hour	$(X+5)	and bonus
Over 130 lines an hour	$(X+4)	and bonus
Over 120 lines an hour	$(X+3)	and bonus
Over 110 lines an hour	$(X+2)	and bonus
Over 100 lines an hour	$(X+1)	and bonus
Over 90 lines an hour	$X	and bonus

The fact that the salaries can be indicated by symbols shows the flexibility of the system. As the standard output was scientifically determined at 150 lines an hour, it remains constant, but the values of X and Y can be and are being increased to amounts consistent with general labor conditions.

Now, just what does this scale of wages mean in actual practice? It means that when we employ a young woman at the standard salary we expect her to be able to get out 150 lines of typewritten copy an hour for 40 hours each week. She may be able to produce that much, and again she may not. But her weekly record as it is reported by the measurers will soon show us her comparative value.

And that I consider as one of the chief advantages of the installation. For we never cut down the salary even if the worker is employed for much more than she really earns. But when slack periods come or changes make it necessary to redistribute workers, we can lay off or put at other work girls who are not earning their salaries. This eliminates the guesswork which is really the chief cause of "firing" in so many offices.

This weekly record is also the basis for promotion of those who deserve it to secretarial and other better positions, and thus further rewards for loyalty and length of service.

Of course, accuracy in letter writing, as in any other work, is of more importance than speed. So we graduated the payment for output in such a way that a worker will make more for accurate and neat work at less speed than she will for a greater amount of work marred by mistakes.

Therefore, we established the following rates of payment—for the excess over the regular salary—for stenographers and dictating machine operators:

10 cents for 70 lines—
rate of payment if no errors are made in a day
10 cents for 100 lines—
rate of payment if 1 error is made in a day
10 cents for 120 lines—
rate of payment if 2 errors are made in a day
10 cents for 150 lines—
rate of payment if 3 to 5 errors are made in a day.
No bonus is paid if more than 5 errors are made.

The last part of the rule—that no bonus is paid if more than 5 errors are made—helps to cut down errors at the fag-end of the day, when it is not well to be more careless.

The scale of wages and rates of payment for typists are slightly lower than these tables, because of the nature of the work; but the typists are promoted as soon as they are qualified, which gives them an incentive to learn the other classes of work. It may seem, too, that the dictating machine operators have an advantage over the stenographers in that they need to take no time off for dictation. The disadvantage—quantitively measurable as a loss of approximately one-fourth of their bonus-earning time—is more than offset, we think, in the greater chance the stenographer has over the operator of passing into other work, such as that of a private secretary.

A count of the errors in each day's work is turned in by the correspondents to the supervisors, who also keep a record of each girl's time so that her bonus will be figured only on the time she has actually spent in typing. This eliminates any chance that her bonus earnings will be unfairly reduced by necessary interruptions for taking dictation, for special work, or for some other cause.

Each batch of letters goes to the measurers, who record simply the number of lines and paragraphs, with the girl's time-clock number. From the two records, the error count and the output totals, the bonus is worked out at the end of each week.

This bonus plan has proved more valuable even than we had hoped. It has cut typing costs in the department in which it was worked out—we are now gradually installing it on other general typing activities—by about 25 per cent. The addition of two girls and part of the time of a third for measuring and figuring bonus for nearly 100 workers is only about 3 per cent of the payroll. Output as a whole has increased 50 per cent of the departments.

Best of all, perhaps, we have a reliable record of what the individual workers can really do. We can pick out those who are worth their wages to us and those who are not—not a negligible advantage at a time when it behooves us all, in whatever business we are, to make the most of labor and time.

WHAT WE HAVE TO CONSIDER IN GRADING WORKERS

It is seen that under this method the lowest salaried workers are not necessarily the least valuable. They may be earning their pay and the higher paid girl—who has been employed on her past record of experience and sal-

BONUS REPORT FOR WEEK ENDING March 9

Name	Activity	Hours Worked	Rate per Hour	Units Produced	Units Task	Excess	Bonus	Total Errors	Basic Rate
Vering	Operator	33.76	274.3	9262	5064	4198	5.67	1	150
Kavanaugh	"	49.17	163.5	8038	6884	1154	1.79	0	140
Diestlow	"	28.99	157.9	4579	2899	1680	2.40	0	100
Resch	"	38.78	155.6	6034	5429	605	.88	2	140
Olund	"	39.74	153.2	6088	5564	524	.75	0	140
Mullins	"	44.51	126.4	5626	5786	-160	-.23	0	130
Sheehan	"	48.75	120.9	5898	5850	48	.07	0	120
Wintz	Typist	20.92	193.6	4050	3138	912	.80	6	130
VanDorn	"	42.01	157.6	6620	5797	823	.70	5	138
Baron	"	30.34	126.2	3831	3792	38	.04	7	125
Frieme	"	39.26	111.2	4363	4436	- 73	.05	8	113
Stepanek	"	42.00	106.3	4464	5796	-1332	-1.33	5	138
Landy	"	45.50	94.6	4306	5142	-836	- .84	11	113

WHO IS DOING THE BEST WORK?

This sheet is the weekly bonus and production record of one group of stenographers and typists. A report similar to this is made every week, and shows the manager the exact amount of work done by each operator, and the number of errors. It indicates also how each compares in efficiency with all the other girls in her department.

ary—may fall far short of hers. The only criterion to consider, then, is whether the output (quality and quantity) is commensurate with the salary. In employing new workers, we engage the best available, paying according to previous experience and past earnings.

We have now considered the advantages to the company, but the fact must not be overlooked that the workers have also greatly profited by increased guaranteed wages and additional bonus earnings. Some individuals have gone much farther than the average, in some instances getting out up to 200 per cent more work than before this system was adopted.

This increase is due, undoubtedly, to the fact that salaries rise just as fast as output consistently grows. A girl who for three successive weeks adds 10 extra lines an hour to her wage standard automatically passes into the next higher group, receiving an additional dollar a week in salary. Her bonus earnings are then, of course, figured on the excess output above the output standard corresponding to her new wage.

One girl's record illustrates the possibilities for the worker. About a year ago this girl came to us as a beginner typist just out of school. About eight months ago she was placed on bonus to start at the same salary. She immediately began increasing her output and raised her salary every few weeks, until she is now receiving as a dictating machine operator $7 a week more than her starting salary and in addition a $2 or larger bonus regularly each week. Some of our other operators are regularly earning $5 to $6 weekly besides the maximum guaranteed wage; they have besides, of course, advancement to other work to look forward to.

The advantages have, therefore, been: a proper control of the work and selection of the workers; a reduction in costs, and at the same time a higher paid, a better contented, and more stabilized group of employes. This means a reduction of that bugbear, high labor turnover, which usually comes as a result of higher wages and more satisfactory working conditions.

Bell Officially Restricts Extensions

A telegram sent out from the Bell offices in New York to the heads of all subsidiary companies early last month reads as follows:

Owing to restrictions which have been imposed or are about to be imposed by the government authority with respect to the securing of money and materials, it will be necessary to revise and to carefully analyze your construction program for the remainder of this year. The capital issues committee of the federal reserve board in Washington has requested that we submit a statement which will make clear to it our construction program for the year and the consequent need for new capital. It will therefore be necessary to justify the expenditures which we are to make for new construction and reconstruction in order that we may be able to market securities with which to complete our financial program for the year. We quote two of the several requirements of the federal reserve board with respect to the information it requires from those making applications for the issuance of stocks or bonds. These will indicate to you how closely our application will be scrutinized.

If the issue is to be made for war purposes or to raise capital in connection with war contracts or war supplies or to provide equipment, buildings or facilities of any kind for war work, full description thereof and amounts needed therefor should be stated.

In all cases all reasons should be given why the proposed issues cannot be postponed until after the war, or why the necessity is greater than the paramount need of the national government in conserving the financial resources, materials and labor of the country for the war.

Not only will we be restricted in securing capital, but we wish to call your attention to the resolution which has been passed recently by the war industries board with respect to securing materials.

"*Whereas*, it has come to the notice of this board that new industrial corporations are being organized in different sections of the United States, for the erection of industrial plants which cannot be utilized in the prosecution of the war; and whereas plans are being considered by certain states, counties, cities and towns for the construction of public buildings and other improvements which will not contribute toward winning the war, and, whereas, the carrying forward of these activities will involve the utilization of labor, materials and capital urgently required for war purposes;

"*Now therefore be it Resolved*, by the war industries board that in the public interest, all new undertakings not essential to and not contributing either directly or indirectly toward winning the war, which involves the utilization of labor, material and capital required in the production, supply or distribution direct or indirect war needs, will be discouraged notwithstanding they may be of local importance and of a character which should in normal times meet with every encouragement.

"*Be it further Resolved*, That in fairness to those interested therein, notice is hereby given this board will withhold from such projects priority assistance without which new construction of the character mentioned will frequently be found impracticable and that this notice shall be given wide publicity, that all parties interested in such undertakings may be fully apprised of the difficulties and delays to which they will be subjected and embark upon them at their peril."

Bell Files Bond in Buffalo

C. A. Spaulding, Buffalo division manager of the New York Telephone Company, has filed the $300,000 bond stipulated by the city when it passed the resolution in 1916 consenting to the merger of the properties of the Federal Telephone and Telegraph Company and the New York Telephone Company.

The contracts being written now are not effective until the tentative date of the consolidation of the two properties in Buffalo, August 1, 1918. The resolution of the council in 1916 provided that if a proceeding before the public service commission be instituted, complaining of any rates filed by the New York Telephone Company for service in the city of Buffalo, the company should be required to file a bond in the amount of $300,000; conditioned that, in the event it shall be finally decided that any such superseding rates shall be reduced, the New York Telephone Company will repay to its subscribers in the city of Buffalo the difference between rates now paid by them and the rates so finally fixed, with interest from the time of the respective payments.

"The filing of the bond is merely another step by the company in carrying out its agreement with the city," said Mr. Spaulding, "and it obviously protects amply the subscribers who are expected to sign contracts at the new rates effective August 1, 1918. The company is willing to give a personal assurance to each subscriber by stamping upon the new contracts the following clause:

If the exchange rates paid hereunder pursuant to the schedule in effect May 1, 1918, are subsequently reduced as the result of the proceeding now pending before the public service commission, second district on the complaint of the city of Buffalo, the subscriber will be entitled to a refund of the excess paid, with interest, in accordance with the terms of the company's bond filed with the city on May 6, 1918.

Mr. Spaulding further says that the work of rewriting contracts is proceeding with great rapidity, the almost unanimous opinion of the subscribers interviewed being that the company had represented fully two years ago in its petition what the rates would be after consolidation, and that practically every subscriber feels that the company is merely carrying out now the agreement it made with its subscribers through the petitions. At the present rate of speed, Mr. Spaulding explained that all contracts will be rewritten early in July this year.

Loading Coils versus Repeaters

Properly Designed and Correctly Installed, Loading Coils Are Adequate for All Long Distance Work

BY W. N. FURTHMAN

IN previous articles in TELEPHONE ENGINEER in discussing the fundamental principles involved in the Shreeve repeater attention has been called to a difficult problem which is involved in the successful distribution of heat. Since the success in operation of the Shreeve repeater depends upon its radiation principles, and in view of the very ingenious methods that were attempted to prove in thermostatic devices a synopsis of Mr. Shreeve's patent No. 1,156,636 may be outlined as follows:

In accordance with one feature of the invention there is provided a receiver and transmitter mounted as a unit and having terminal connections which may be readily and quickly made or severed without disturbing the fixed wiring of the circuit. More particularly the receiving and transmitting elements are each individually removably mounted end to end upon a tubular block. Terminals extending through the block from one end thereof to the other for the receiver and from one electrode

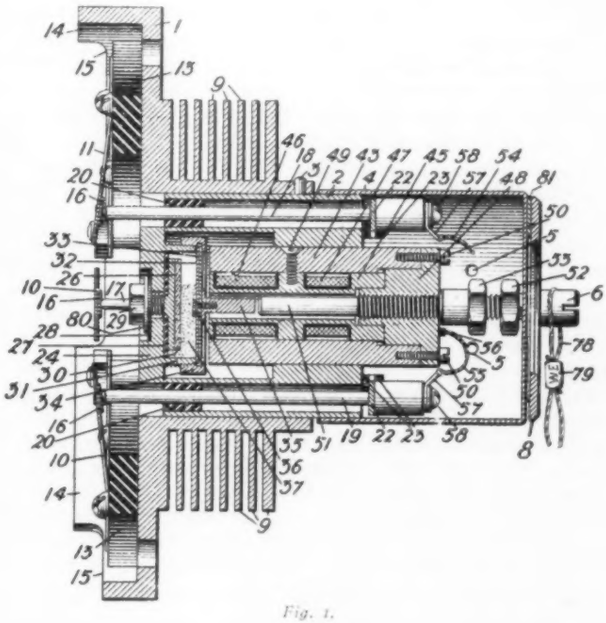


Fig. 1.

of the transmitter arm are arranged to co-operate with spring clips upon a base or socket part adapted to receive the block. The vibratory member of the transmitting element when thus assembled is enclosed within the cylindrical block and thus wholly removed from outside disturbing sounds and protected from mechanical injury. The block supporting the elements may be likened to a cartridge which by a simple movement may be withdrawn from its socket and immediately replaced by another similar structure. The block surrounding and supporting the elements is provided with holes running from one end thereof to the other, which serve as air passages for ventilation and heat radiation. Preferably the base part is provided with heat radiating plates, which serve to quickly dissipate the heat conducted from the cartridge part to the base part and to that end the surface contact between these parts is made quite large.

According to another feature of this invention, means are provided for automatically relieving the pressure upon the granular carbon in the transmitter element upon an increase of current therethrough, whereby packing of the granular carbon is prevented. The transmitted element is provided with a thermostatic diaphragm and is connected in circuit with the receiver, the diaphragm being arranged to bow outwardly to relieve the pressure in the transmitter upon an increase of current in the circuit, the receiver being also adapted by magnetic attraction to bow the diaphragm outwardly upon an increase of current in the circuit.

In the drawings there is shown a metal base piece *1* having a central opening or socket into which a cylindrical metal block *2* may be readily inserted or withdrawn, the block being held in place when inserted by a pin *3* engaging an angular slot in the wall of the base piece. Fitting over the exposed end of the block *2* is a cap *4* having ventilating perforations *5*, the purpose of which will be more fully explained hereinafter. The cap is adapted to be held in place by screws *6*, engaging the ends of elongated bolts *7* extending outwardly from the block *2*. Interposed between the heads of the screw *6* and the cap *4* is a flat ring *8* and a distance piece *81* which together form a frame for a number or instruction card to be placed between it and the cap. The heads of the screws *6* are perforated to receive a wire *78* which may be tied or sealed midway between the heads by a lead seal *79*. Formed integrally with the base piece *1* are a series of heat radiating plates *9* and upon the rear side of the base are three contact springs *10*, *11* and *12* mounted upon insulating blocks *13*. Circuit connections to the frame and to the three contact springs *10*, *11* and *12* are made through the binding posts *38*, *39*, *40* and *41*, respectively, these being mounted upon

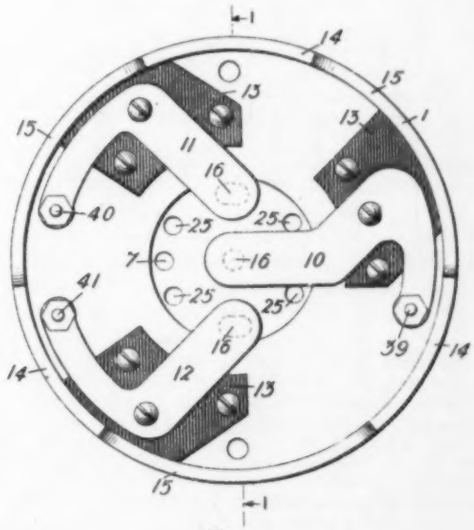


Fig. 2.

segments of insulating material at *42*, and the latter three thereof being insulated from the frame by suitable bushings. Binding post *38* is in direct contact with the frame. The base has an overhanging flange *14* extending beyond the level of the contact springs and their retaining screw heads, this flange, however, being partly open at *15* to permit free circulation of air. The three contact springs *10*, *11* and *12* extend inwardly to points in line with the socket opening and are each provided with a contact surface *16*, preferably of platinum. Co-operating with the contact springs, when the block *2* is in place in the socket of the base piece *1*, are three contact rods *17*, *18* and *19*. Rods *18* and *19* extend through the block *2* from one end to the other and are insulated from the block by bushings *20*. These rods are held from movement endwise by screws *21*, *21* engaging wings *22*. These wings and screws are insulated from the block by rubber bushings *23*. At one end of the block *2* is a circular plate *24* which is held in place by the bolts *7* passing through the block from the opposite end. Four holes *25* extending through the block *2* from end to end serve as air passages for ventilation. The plate *24* has a central opening through which the contact rod *17* extends, this rod serving to support an electrode plate *26*, in the inner surface of said plate *24*. The electrode *26* and rod

17 are insulated by sheets of mica 27 and 28 and held in place by a nut 29 and washer 80, the nut engaging threads on the rod 17. This rod 17 serves also to electrically connect the electrode with the contact spring 10. The electrode plate 26 has a facing of carbon 30. Formed integrally with the plate 24 is an externally threaded flange 13 which forms the side walls of a granular carbon transmitter button. The inner surface of this flange is coated with insulating enamel.

The opposing electrode of the transmitter button is a vibratory diaphragm formed of two thin plates of metal, the inner one, 32, of gold and the outer one, 33, of iron. These plates are clamped together at their outer edges by an internally threaded flanged ring 34 engaging the flange 31 of the plate 24. Centrally mounted upon the diaphragm is an iron rod or pole piece 35 held in place by a gold plated screw 36. The transmitter button thus constructed is partly filled as shown with granular carbon 37, the circuit through it passing from the spring 10 to the contact 17 and thence by way of the electrode 26 through the granular carbon 37, and the vibratory diaphragm 32, 33 to the frame 1 and binding post 38.

The receiving element of the repeater comprises a cylindrical iron or steel shell 43 fitting snugly within the block 2 and held in place by a set screw 44, a compound magnet spool 45 of brass or other non-magnetic material, windings 46 and 47 thereon and an iron head 48. The spool is held in place by a screw 49 passing through the side of the shell 43, and the head 48 is held in place against the outer end of the shell 43 by screws 50, 50. Extending centrally through the head 48 is a pole piece 51, the end of which is presented toward and lies close to the end of the opposing pole piece 35. The pole piece 51 is enlarged

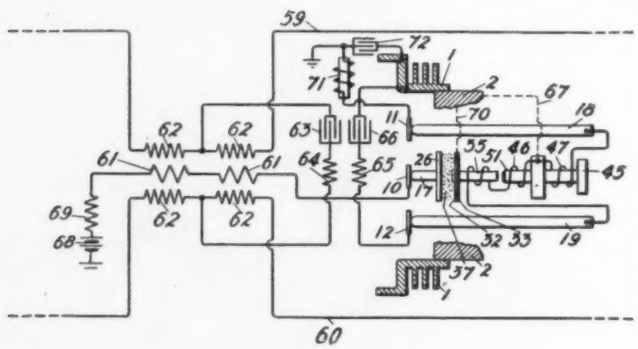


Fig. 3.

and threaded where it passes through the head 48 and is provided with a hexagonal head 52 and a nut 53 by means of which the air gap between pole pieces 51 and 35 may be adjusted. One terminal wire of each of the windings 46 and 47 is connected to the central part of the spool head and is thus metallically connected to all parts of the frame of the instrument. The other two ends 54, 55 of the windings are brought through to the outer end of the spool and thence to the outside of the head 48, being insulated therefrom by rubber bushings 56. These terminal wires 54 and 55 are connected to the outer ends of the contact rods 18, 19 by means of terminal clips 57 and screws 58. The winding 47 being farthest away from the air gap between the electrodes is the magnetizing winding, while the winding 46 is the receiver winding. It will be noted that the electrode rods 35 and 51 extend freely through a central opening in the spool 45. With this construction the shell 43 may, if desirable, be of steel and form a permanent magnet, in which case the magnetizing winding would be omitted.

A suitable circuit arrangement for the telephone repeater herein described is shown in Fig. 3, wherein 59 and 60 are the main wires of a telephone line and 61, 62 the primary and secondary windings respectively of an output repeating coil. The winding 62 is included directly in the two line wires 59, 60 and from a central point in this winding in each wire and bridged across the circuit is a condenser 63 in series with one winding of an input repeating coil comprising the windings 64, 65. The winding 65 is in a local circuit which includes a condenser 66 and the receiver winding 46 of the repeater, this circuit passing from the condenser 66 to the frame 1, thence to block 2 in contact with the spool 45, winding 46, contact rod 19, contact spring 12, and input repeating coil winding 65. The connection from the block 2 to the spool 45 is indicated in the circuit diagram by a dotted line 67. A local circuit is also provided for the transmitter button and the magnetizing winding 47 as follows: from the grounded battery 68 to the resistance 69, primary output repeating coil winding 61, contact spring 10, contact rod 17, electrode 26, carbon granules 37, vibratory diaphragm 32, 33, block 2, spool 45, winding 47, contact rod 18, contact spring 11 and impedance coil 71 to ground and back to battery 68. The connection from the vibratory diaphragm 32, 33 to the block 2 is indicated by a dotted line 70. That portion of the last described circuit which includes winding 47 and the impedance coil 71 is shunted by a condenser 72; the function of the impedance coil 71 is to limit the flow of current in this local circuit and that of the condenser 72 to localize the microphonic currents in the transmitter button and to exclude such currents from the magnetizing winding 47.

In operation voice currents coming over the circuit of line wires 59, 60 from either direction will, by induction through the windings 64, 65, cause variations in the attractive forces between the pole pieces 51 and 35 of the receiver, thereby causing corresponding variations in the resistance of the transmitter button and of current in the local transmitter circuit. This local circuit includes the primary winding 61 of the output repeating coil which thus causes a reinforcement of the telephonic currents in the line.

The writer believes it has been made clear that the principal obstacle to the successful use, operation and maintenance of any type of repeater, consists in the numerous irregularities that are found in any commercially operated long distance line. An automatic repeater has not, to the writer's knowledge, been designed or even considered. In other words it seems to be universally conceded that these irregularities in a commercial circuit are of sufficient number and of such serious importance as to warrant the special attention of a very capable wire chief at each repeater station.

It may be said in a general way that the use of loading coils may add materially to the number of these irregularities in any particular section of a line. Since it is the contention that a repeater can not be successfully used and operated without loading, it may be well at this phase of the discussion to point out the loading coil irregularities in a circuit and the means that may be employed to correct them. It is well known to those acquainted with use of loading coils that irregularities in loaded lines are highly objectionable and very materially reduce the advantages that are otherwise to be obtained in their use. Irregularities in a loaded line not only increase the attenuation of the line but also bring about reflection losses. They also make it difficult, if not impossible, to balance the line impedance with artificial lines in two way repeater circuits. It can be stated as a matter of actual fact that this condition is the limiting factor as to the amount of amplification that may be successfully added to a line without undue disturbance.

Loading irregularities may be due to two kinds, first irregularities of the coils and second, irregularities of the line. It has been shown that the irregularities in the coils may be overcome by proper manufacturing methods and provided a coil not subject to magnetization is produced suitable for commercial use. Line irregularities may be due to the differences in the actual length of the loading sections, that is the distance between consecutive loading coils or to different distributed line constants in the conductors of the different sections. Practical conditions often make it very difficult to construct a loaded line in a uniform manner so as to comply with the best conditions for operating a repeater and at the same time correct irregular line conditions without bringing about considerable expense.

It will be immediately clear that provided a simple means could be devised for obtaining both of these desirable features it would not be necessary to change the construction of line or require the relocation of the loading coils.

It has been previously pointed out in these articles that good commercial long distance transmission can be obtained without adhering absolutely to the rigid requirements outlined in Dr. Pupin's formula. The difference between the calculated distance for loading coils and the actual distance required for good transmission is a mighty fine example of this condition. It was at one time considered very essential that the loading sections be of the same length and have equal line constants. It has also been found that if the total electrostatic capacity is made equal by the introduction of suitable capacities between the lines having a defect of capacity the line will react electrically like a very uniform line and will possess all of the valuable features found in uniformity of loading a sectional length previously obtained only by the most careful construction of the loaded line.

Reference to formula outlined in these articles will show that it is the practice to have the loading sections electrically short and that the distributed inductance of the loaded line section is very small compared to the inductance that is added to the line by the amount of inductance of a loading coil. Provided therefore that the time constants of the loading coil are preserved it will be clear that the irregularities that take place in a line are brought about as differences in the line capacity per loading section.

It will be seen then that provided the capacities of the different loading sections are made equal, the line will be an electrical uniform loaded line even though the different sections are widely unequal in length and distributed time constants. Upon inserting such capacities extreme care must however be used to insure that any irregular section to be made uniform must be proportioned so that the resultant capacity of such a section is equivalent to the normal section.

It will be plain that the insertion of a capacity may be properly made either to increase capacity in the irregular section or to overcome a defect in the distributed line capacity of such a section. Since the polarity of such a condenser is known it can of course only be used in an irregular section where such a capacity is a defect and not an excess of capacity.

It will be evident then that the best practice will require that where there are a large number of irregular sections in a line, it is highly desirable to select the section as the normal section that contains the greater amount of capacity and insert the equalizing capacities in all of the other sections.

Irregularities of a reverse nature may be encountered in actual practice. Sections having an excess distributed capacity can be made into short sections by the use of more loading coils and the consequent defect of capacity corrected by condensers. When it is understood that a similar method can be used for the correctness of loading a phantom circuit without causing interference or crosstalk some idea of the relative efficiency of the plan is obtained.

Another device which has been mentioned as absolutely required in connection with the successful use of a repeater is known as a Wave Filter. In order to maintain the determined efficiency of the circuit a filter of this kind must be adapted to transmit with a negligible amount of attenuation sinusoidal currents of all frequencies lying within a range of preassigned limiting frequencies. It must also be adapted for attenuating and approximately extinguishing sinusoidal currents lying outside of such limiting frequencies. Briefly described a wave filter of this nature may be said to be a connecting line having an impedance in series with the line properly proportioned to an impedance element in shunt across the line.

It is a well known fact that on a uniform transmission line containing uniformly distributed resistance, inductance and capacity the attenuation of current along the line is a phenomenon which is caused by resistance dissipation and becomes zero when the resistance becomes zero. In a periodic structure such as a wave filter containing lumped series impedance and lumped shunt impedance high attenuation may exist even when the resistance is to all purpose practically zero. The design and use of a wave filter are intricate and difficult problems because of the reactions and interactions taking place in the structure and determining the character of the attenuation attending transmission of periodic currents.

For those interested in deriving the mathematical formulae pertaining to the theory of a wave filter the following data may be of interest.

Assume a structure consisting of a series of sections, each section having an impedance Z_1 in series with the line, and an impedance Z_2 in shunt across the line. Let J_N denote the circuital current flowing in the nth section of the structure; $J_N - 1$, the current flowing in the $(N-1)$st section, and $J_N + 1$ the current flowing in the $(N+1)$st section and applying Kirchhoff's law to such currents and circuits it follows that:

$$Z_1 J_N + Z_2 (J_N - J_N + 1) + Z_2 (J_N - J_N + 1) + Z_2 (J_N - J_N 1) = 0$$

By various rearrangements this equation may be simplified as follows:

$$\frac{J_N + 1}{J_N} + \frac{J_N - 1}{J_N} = \frac{Z_1}{Z_2} + 2$$

this equation being a difference equation and under the principles of the calculus of finite differences the ratio of $\frac{J_N + 1}{J_N}$ is equal to the ratio of $\frac{J_N}{J_N - 1}$ the equality of such a ratio holding for propagation in either direction. If this ratio is set equal to E^R without specifying the value of R, it follows that for propogation in either direction $\frac{J_N - 1}{J_N} = E^R$ and $\frac{J_N - 1}{J_N} = E^R$.

(1) In these equations, E denotes the base of Naperian logarithms and R denotes the propagation constant of the structure. If the value of R is a purely imaginary, the absolute values of J_N and $J_N + 1$ are equal, and hence the current suffers no attenuation in transmission from section to section, but only a change of phase.

Consider L_1 and C_1, as representing the series impedances in the line and L_2 and C_2 as in parallel shunt impedence, then

$$L_1 C_1 = L_2 C_2 = \left(\frac{1}{2\P F_2}\right)\left(\frac{1}{2\P F_0}\right)$$

and $$\frac{L_2}{L_1} = \frac{1}{4}\left(\frac{F_0}{F_2}\right)\left(\frac{F_2}{F_0} - 1\right)^2$$

Now substituting for F_0 and F_2 the preassigned values of 200 and 2,000 periods per second as representing the extreme range of voice frequency it is proposed to pass through the filter, then

$$L_1 C_1 = L_2 C_2 = \left(\frac{1}{2\P 2{,}000}\right)\left(\frac{1}{2\P 200}\right) = \left(.635\right)^{10-7}$$

and $$\frac{L_2}{L_1} = \frac{1}{4}\left(\frac{200}{2{,}000}\right)\left(\frac{2{,}000}{200} - 1\right)^2 = 2.025$$

Since one of the constants is arbitrary, a value of one

henry for L_2 gives $L_1 = .494$ Henry, $C_1 = .129$ microfarad and $C_2 = .0635$ microfarad. The attenuation constant per section at a frequency of 2,200 cycles per second, for example, is found as .98 computated from this equation:

$$\text{Cosh } R = \frac{1}{2}\left(\frac{Z_1}{Z_2}\right) + 1 \quad (2)$$

From equation (1) the ratio of currents in the adjacent sections is 2.67 approximately and if five sections are employed the current of 2,200 cycles in the fifth section is less than 2 per cent of its value in the first section, while currents of frequency lying between 200 and 2,000 cycles per second are practically unattenuated.

In considering the formulae set forth, it should be made clear that the structure and function of a wave filter has a different fundamental basis from that of a transmission loaded line system. It has been pointed out in these articles that in a transmission line in which loading coils may be advantageously inserted, the attenuation is excessive and the sole purpose and object of loading coils is to reduce the attenuation which exists in a normally unloaded line.

In a loading coil system it is also required that the loading elements shall be properly spaced or corrected as a matter of capacity. In a wave filter system, the line in which the impedance elements are inserted is so short that under normal conditions the attenuation of such a system may be entirely neglected. When, however, the impedances are inserted in accordance with the above noted formulae the normal non-attenuating line sharply attenuate currents of preassigned frequences while freely transmitting currents of other frequencies. It will be clear, therefore, that such a system is of particular value in composite telephone and telegraph systems and in repeater systems that are subject to electrostatic and inductive disturbances. They also prevent currents other than those necessary for telephonic transmission from entering the input side of the repeaters, thus eliminating singing or howling.

Since long distance lines are invariably used for telegraph purposes, it will be apparent that it is also necessary to prevent superposed or composited telegraph frequencies from disturbing the repeater. Provided the wave filter system can be arranged to permit the transmission of prearranged frequencies, it logically follows that the artificial line system also associated with a repeater system need only simulate the impedance characteristics of the telephone line over a limited range of frequencies. In this manner the wave filter brings about a more simple, efficient and economical artificial line and thus partially earns its cost and maintenance.

(*To be continued.*)

Investigate Chicago Rates

Profits of the Chicago Telephone Company have so decreased because of the war that the company is demanding an increase in rates amounting to about 14 per cent. Notice of the proposed increase in rates was served on the gas, oil and electric light committee of the Chicago city council by President Bernard E. Sunny. The company prefers to secure added revenue by doing away with the flat rate telephones. Otherwise the nickel in the slot telephone is threatened, it is said. The company presented three plans to the committee, as follows:

1. A horizontal increase of 14 per cent on all exchange rates, which would produce an additional revenue of about 14 per cent, but, in the opinion of the telephone officials, be unfair to many subscribers.

2. Change all flat rate service to measured service, which, it is estimated, would give an added revenue about equal to the falling off in the profits.

3. Increase of about 75 per cent in charge for flat rate service if it is to be continued. This would give the desired revenue.

The falling off in the earnings is said by Mr. Sunny to be due to the increased cost of labor and material. He said the company suffered a net loss of $20,951 last year and in order to meet expenses additional revenue of $2,500,000 must be found. The telephone company can appear before the state public utilities commission, it is said, with a request for permission to increase its rates.

The notice of the company that it wanted better rates was a surprise to the committee. The contract expired May 26, and the committee was hurrying action toward negotiations for a renewal of the established rate. Several aldermen had declared for retaining the present rates, when Mr. Sunny urged that an investigation of the situation be made.

The committee directed Chairman T. J. Lynch to appoint a subcommittee to decide whether the city will undertake the investigation through its public service department or will engage outside help.

Consulting engineers told the council subcommittee on gas, oil and electric light May 24 that there is no valid reason why telephone rates in Chicago should be increased.

The engineers appeared before the committee in connection with their prospective employment by the city to conduct the proposed investigation of the properties of the Chicago Telephone Company with a view to revising existing rates.

William N. Furthman, who represented the City of Peoria in its telephone fight, said the Chicago company was paying unnecessary profits. He said it pays 4½ per cent to the American Telephone & Telegraph Company, commonly known as the Bell or parent company, in addition to the 8 per cent paid to surety holders.

He charged that the Chicago company pays the Western Electric Company 25 per cent more for the use of that company's equipment than would be charged by Independent concerns.

H. M. Friendly, for years an official of branches of the parent company, said rates in Chicago are higher than any large western city.

Prof. Edward W. Bemis, who conducted the last investigation of the telephone company for the city, five years ago, said the corporation was paying $500,000 more for the use of its equipment than what a fair price would be.

He said the company maintains a depreciation fund and that $2,000,000 a year is added to it. This, he said, produces a burden on the profits.

President Sunny of the corporation told the aldermen the charges made were known five years ago when an investigation was conducted at that time. He said there is nothing secretive about them.

An appropriation of $50,000 is demanded for an investigation and the matter is now in the hands of the City Council Finance Committee.

Colonel Carty Receives Edison Medal

Famous Telephone Engineer Honored by Meeting of the American Institute of Electrical Engineers

DR. JOHN J. CARTY, colonel in the United States Army Signal Corps and chief engineer of the American Telephone and Telegraph Company, has been awarded the Edison Medal in recognition of his services in developing the science and art of telephone engineering.

The medal was presented on Friday evening, May 17, at the annual meeting of the American Institute of Electrical Engineers in the Engineering Societies Building in West Thirty-ninth street, New York. Colonel Carty is the eighth American scientist to be honored in this way, the others being Elihu Thomson, Frank J. Sprague, George Westinghouse, William Stanley, Charles F. Brush, Alexander Graham Bell, and Nikola Tesla.

A statement of the history and significance of the medal was made by Dr. A. E. Kennelly, professor of electrical engineering at Harvard University and Massachusetts Institute of Technology, who was chairman of the Institute's 1917 Edison Medal Committee. Dr. Michael I. Pupin of Columbia University told of the work of Colonel Carty, the foremost telephone engineer in the world. The medal was delivered by the president of the Institute, E. W. Rice, Jr., also a scientist of note, who is president of the General Electric Company.

Colonel John J. Carty.

The Edison gold medal was founded in 1904 by the Edison Medal Association, an organization composed of old associates and friends of Thomas A. Edison. It is awarded annually by a committee of twenty-four members of the American Institute of Electrical Engineers, and was first awarded in 1909, the recipient being Elihu Thomson. It was designed by James Earle Frazer, and bears on its obverse a portrait of Thomas A. Edison, and on its reverse an allegorical conception of "the genius of Electricity crowned by Fame."

More than any other man, Colonel Carty is responsible for the development of telephone engineering as it is known today, and it is peculiarly fitting that he should receive this new honor at a time when he is working day and night to promote the best military use of mediums of communication which have been developed largely through his efforts in time of peace for the advancement of the nation's social, commercial, and industrial activities.

The Edison Medal Presented to Colonel Carty.

Colonel Carty is well known as the engineer of the great transcontinental telephone line, the longest in the world, and as the engineer who made possible wireless telephoning over distances up to 5,000 miles.

He entered the telephone business when it was in its infancy, and it would be difficult to find a phase of its development which does not bear some imprint of his genius. The technical achievements of Colonel Carty are so numerous as to prevent full recounting. He pointed out the theory of induction between telephone circuits, showing how to obtain a balanced metallic circuit and devising methods for transposing phantom telephone circuits. That was in 1887. In 1888 he developed the bridging bell and pointed out the importance of the bridging principle of telephone construction in obtaining efficient operation of telephone systems and in constructing balanced metallic circuits. In 1889 he invented the principle of the best and most generally used common battery system, by which a number of telephone instruments may be simultaneously operated from a single central battery. During this period he also devised important improvements pertaining to switchboard circuits having to do with the busy test feature and the connecting in of operators' instruments.

In 1912 the telephone engineering force built up and directed by Colonel Carty had so far overcome the difficulties in the way of underground telephony as to make possible all-underground talking between New York and Washington, and by 1913 they had extended the range of underground telephony to connect Washington and Boston.

Nineteen hundred and fourteen witnessed the fruition of the efforts of these engi-

neers to bring transcontinental telephony into existence, and in 1915 Colonel Carty was able to present to the world important developments in wireless telephony, which made possible the hurling of words through space across the American continent from Washington to Mare Island, California, from Washington to Hawaii, 4,900 miles distant, and from Washington to Paris, bringing Europe and America into speaking distance of each other for the first time.

Then came the threat of war with Germany, and in 1916 Colonel Carty co-operated with the Signal Corps of the army and with the various departments of the navy in making arrangements which would insure the readiness of the Bell Telephone System for military service in case this country did become involved in the great conflict. Nineteen hundred and seventeen saw these plans put into active use with a marvelous degree of success.

Colonel Carty's technical telephone achievements alone would entitle him to his pre-eminent position in his field, but he also occupies an equally high place in the regard of scientists because of the character of his work in directing, developing and co-ordinating telephone engineering. Men who have been associated with him say that his success is due not only to his scientific genius, but also to his understanding of the requirements of the service he has done so much to improve.

He has always insisted upon the importance of determining the requirements of the service before undertaking to develop specific ideas. He has always emphasized the necessity for getting the full set of facts in each case and of studying the effects of growth so that a new device may not only be satisfactory at the start, but may fit into the system as it develops. The several hundred engineers engaged by the Bell System in conducting reasearches, testify to the value which Colonel Carty places upon this phase of telephone work, just as they do the emphasis he puts upon the importance of keeping bad devices and methods out of the telephone plant. Colonel Carty is known also for his marked ability to make friends with and inspire confidence in those with whom he comes into contact, so that his name is one to conjure by among those for whom he works, those with whom he works, and those who work for him.

Dr. Pupin said that "Carty's life is filled with romance. He never went to college. At the age of 18, when other boys entered college he entered the service of the American Bell Telephone Company, and at the age of 28 became chief engineer of the great New York Telephone Company. He started without getting honors, titles, and now he is a doctor I do not know how many times, and on the top of these titles colonel of the United States army. If General Pershing has his way, Carty will be a general before many a day. General Pershing understands that Carty is made of stuff of which great generals are made."

After Dr. E. W. Rice, Jr., president of the Institute, presented the medal, Colonel Carty in his speech of acceptance gave credit for the American Telephone achievements to the engineers who have been associated with him in the Bell System, and paid a tribute to Major-General George O. Squier, chief signal officer of the United States army, for his work in planning before the United States entered the war for the rapid mobilization of telephone wires and telephone men for Signal Corps work. Referring to the Bell System engineers Colonel Carty said:

"We hear a great deal about the German scientist and the wonderful things he has done and has been planning. Many years ago, when German 'kultur' was interpreted by many to mean German culture, it was suggested to me that we should send to Germany to get some of the Herr Doctors to teach us the high science. I always opposed that, believing that the Yankee mind, the Yankee boy, when his attention was turned to scientific problems would surely outdistance a German. I concluded that our work could be trusted to these young Yankee minds and that they should be trained in our work and that through them we would undertake to outdistance anything that has been done in Germany. That policy has worked out successfully. The young men who have collaborated with me all these years are graduates of over one hundred universities all here in America.

"When at the opening of the war there was a searching of hearts and a census and a taking account of stock to find out who was loyal and who was to be suspected, I know you will all be pleased to hear that among all of these scientists and all of these engineers working in the Bell System all over the United States we were not able to find one single Hun; they were all true Americans to the core."

Colonel Carty's honors are almost as numerous as his contributions to the science of telephony. He received the degree of Doctor of Engineering from Stevens Institute of Technology in 1915; Doctor of Science from the University of Chicago and from Bowdoin College in 1916; Doctor of Laws from McGill University in 1917. In 1903 he received the Edward Longstreth medal from the Franklin Institute of Pennsylvania, and in 1916 the Franklin Institute bestowed upon him its highest honor, the Franklin medal, "in recognition of his distinguished service to mankind rendered in the field of science."

For his service in connection with the establishment and development of the telephone system in Japan, Colonel Carty twice received the formal thanks of the Japanese imperial government, was decorated by the emperor of Japan in 1909 with the Imperial Order of the Rising Sun, and in 1912 with the Imperial Order of the Sacred Treasure of the Meiji.

Colonel Carty is a past president of the American Institute of Electrical Engineers, of which he has been a member since 1890, and a Fellow since 1913. He is chairman of the Executive Committee of the National Research Council, a trustee of the Carnegie Institution of Washington, a past president and life member of the New York Electrical Society, a fellow of the American Academy of Arts and Sciences, a fellow of the New York Academy of Sciences, and an honorary fellow of the American Electro-Therapeutic Association. He is a member of the Society for the Promotion of Engineering Education, the National Society for the Promotion of Industrial Education, the American Physical Society, the Franklin Institute of Philadelphia, the American Association for the Advancement of Science, the Society of Arts of the Massachusetts Institute of Technology, the Telephone Pioneers of America, the Association of Railway and Telegraph Superintendents, the American Geographic Society, and various telephone societies.

Changes "German" to "Dillon"

The German Telephone Company, a farmers' mutual line out of Dillon, Iowa, has voted to change its name to the Dillon Farmers' Telephone Company. The action is taken because the German officers, who are loyal, do not want to be known longer by the objectionable name.

European Telephone Practice

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THE MECHANICAL RESISTANCE OF TELEPHONE POLES—(Concluded.)—In the May Issue of TELEPHONE ENGINEER we took up the mechanical resistance of telephone poles first from the general theoretical standpoint and then brought the discussion down to the ordinary pole, standing by itself, using no special reinforcement. The present issue, which concludes the discussion, takes up reinforced poles; poles using stays or anchors, poles coupled with strutted or braced poles. Using the equations deduced in the last article, the author tries to prove the advantages and the disadvantages inherent to each type of pole. He concludes finally that it is more logical to determine beforehand the resistance of the type of poles to be used and then reinforce it, if necessary, rather than follow the inverse order of things, as is often done.

Reinforced Poles.—In a telephone line which does not run exactly in a straight line, the curves encountered may become so pronounced that special consideration has to be paid to the construction and use of the poles. We have seen that for a telephone line using 38 sq. mm. (48.26 circ. mils) wire, the 39-foot telephone pole is just right, if the line runs straight. But at the least deviation of the line, this type pole cannot meet all the requirements.

One can thus take account easily of the value of the resultant R of the traction forces as functions of the

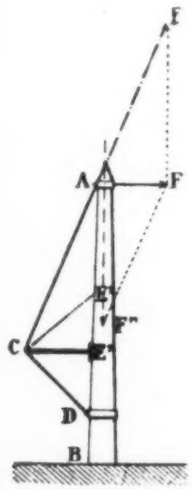


Fig. 7.—Pole Braced Against Itself.

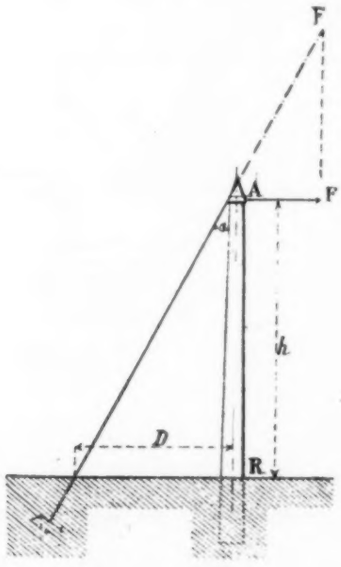


Fig. 8.—Anchored Pole.

angle of deviation α of the line shown in Fig. 6 (May TELEPHONE ENGINEER, page 239) by showing that if the two tractions are equal to T, we have $R = 2T \sin \frac{a}{2}$ and that the factor $2 \sin \frac{a}{2}$ has for its value:

Values of angle a.....	5°	10°	15°	20°	25°	30°	40°	50°	60°
Values of $2 \sin \frac{a}{2}$....	0.088	0.174	0.262	0.348	0.432	0.518	0.684	0.846	1

In such cases it is frequently necessary to reinforce the poles and for this purpose several methods are in use. We shall examine poles stayed or braced against themselves; poles braced against some solid point outside the pole or else braced by the use of anchors; coupled poles and strutted poles.

1. *Poles Stayed Against Themselves.*—Fig. 7 shows a pole using steel braces from the top of the pole down to a point several feet above ground, but not extending

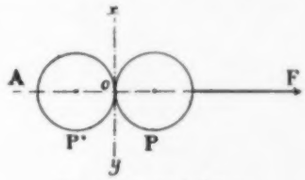


Fig. 9.—Coupled Poles.

outside of the pole itself. A steel rope is fastened to the top of the pole, passes over a bracket CE and is then attached towards the base of the pole by a collar placed at D. Often the bracket is strengthened still more by a strut CE' and the brace is provided with a threaded screw joint which allows the tension to be adjusted within narrow limits.

It is at once clear that the horizontal effort F exercised at A can be resolved into two other efforts, one of which, AF'', exerting its force vertically, will subject the pole to compression forces, while the other, AF', following the path of the steel brace in the direction CA, will draw on the point D, compressing the bracket CE.

But it should be remarked that the resistance of the pole is not increased at all, for one does not exert any influence whatever on the forces exerted on the cross section of the pole at the point of danger, the breaking point B. All one has done is to create a rigid solid surface ACD and has thus avoided the bending of the pole, which in itself is something of interest. But on the other hand, this will not prevent, if an unexpected and excessive bending stress should occur, that the pole will fail to stand the surplus tension and will snap off between D and B.

Consequently, we have only an apparent strengthening of the pole, which has a satisfactory result only under certain special conditions. The calculation of the section to be given to the brace is easy; the effort F resolved into components following the direction CA will give a component AF', whose value is determined by the geometrical relation: $\frac{AF'}{AC} \times \frac{F}{CE}$, from which we obtain

$$AF' = F \frac{AC}{CE}$$

Knowing AF' one determines the section of the brace, generally a steel cable, by admitting a general maximum load of 38 to 40 kg./sq. mm. (53,960 to 56,800 lbs./sq. in.). In a like manner one can compute the compression force CE and the tension on the collar D by moving the point of application of the force AF' to C and then resolving it in turn into the two components, following the directions CE and CD.

2. *Anchored Poles.*—In European practice the use of an anchor, anchored 6 or 9 feet underground (Fig. 8) is rather infrequent; besides, they think this is rather insecure, for the anchor guy rope can be snapped off by some careless driver of a conveyance. On the other hand, one can apply the anchorage principle by tying the anchor to some immovable neighboring object, like another pole, or a tree or the wall of a house, etc.

If F is the resultant of the horizontal efforts, F', the component following the direction of the guy rope, extended in a vertical plane from the resultant, α the angle of the guy rope with the pole, finally D the distance from the anchorage to the foot of the pole, then we have:

$$F = \frac{F}{\sin \alpha} = F\sqrt{1 + \left(\frac{h}{D}\right)^2}$$

The maximum of the value of F' corresponds to the case of a horizontal guy and we have $F' = F$.

Knowing F, we can easily deduce the tension on the guy, and consequently, the section which we choose for the latter, basing the load again on one of 38 to 40 kg./sq. mm.

In those cases where it is impossible to find a rigid point for attaching the guy outside of the pole, one must take recourse to anchors. These anchors are either heavy castings some 16 inches in diameter or else made of two heavy planks set in shape of a cross, which are placed at the bottom of a trench dug down to a depth of about 5 feet. It is best to fill up the trench with earth and rocks piled up carefully and it is even advisable to fill in the cracks between rocks and earth by pouring cement over them.

One can even go further—and this might well be done in important places—and calculate approximately the necessary anchorage area. To do this, we must figure the anchorage to consist of the weight of a mass of earth, having the shape of a reversed pyramid, having for its base the anchorage used, whether wood or iron, and for lateral faces the sloping sides of earth, whose angles are constituted of the natural slopes of the trench sides.

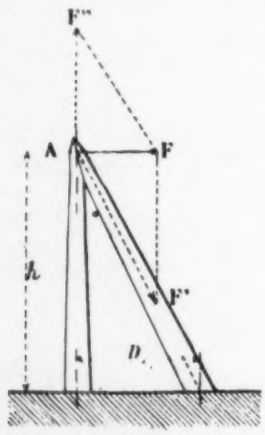


Fig. 10.—Strutted or Braced Pole.

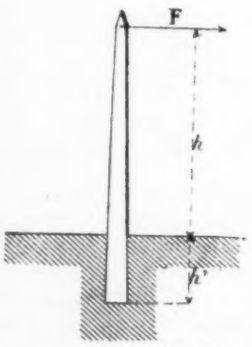


Fig. 12. Simple Pole Setting.

3. *Coupled Poles.*—While the two methods of bracing just discussed are used rather infrequently in Europe, partly owing to their insufficient effects of reinforcement, the use of coupled poles, now to be discussed, has come into very favored use, because it offers great resistance to all kinds of forces and is, moreover less cumbersome in relation to surrounding objects.

The coupled poles consist of two poles that are set side by side and are held together by several bolts, so that they form one unit. It is quite evident that if the resultant of the forces is directed perpendicularly to the line of centers, the force of resistance of the combined pole units will be practically doubled. But if this resultant acts in the same direction as the line of centers, then of course matters lie quite differently. Let P and P' (Fig. 9) be the two poles. The equation which expresses the resistance of a pole can be written:

$$R = Fh \times \frac{n}{1}$$

Now n is the distance AO from the most stressed fibre A to the neutral fibre O; therefore $n = d$; d being

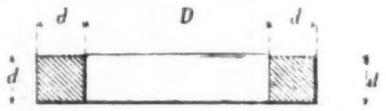


Fig. 11.—Second Method for Braced Pole.

the diameter of the simple pole at the setting. We know, however: 1. That the moment of inertia of a circle in relation to its diameter has for its value: $\frac{\pi d^4}{64}$. 2. That the moment of inertia of a circle in relation to any axis xy is equal to the moment of inertia, related to an axis passing through the center of this circle (center of gravity) increased by the product of the mass by the square of the distance between the two axes. Now the mass in this case has for its value $\frac{\pi d^2}{4}$ and the distance between the two axes is equal to $\frac{d}{2}$.

There follows then that the moment of inertia of the circle P' with reference to the axis xv has for its value:

$$\frac{\pi d^4}{64} + \frac{\pi d^2}{4} \times \left(\frac{d}{2}\right)^2 = \frac{5\pi d^4}{64}.$$

The coupled pole being made up of the union of two simple poles P and P', the moment of inertia I of the unit will be twice as great, i.e.: $I = \frac{5\pi d^4}{32}$. Let us replace I by this value in equation (8) and we have:

$$R = Fh \frac{d}{\frac{5\pi d^4}{32}} = \frac{32\,Fh}{5\pi d^3}$$

If we admit that we can replace, as was done before, $\frac{32}{\pi}$ by 10, and if we give to R the value of 0.6 kg./sq. mm., we will see that the admissable maximum value for F is obtained from the equation: $0{,}6 \geq \frac{2\,Fh}{d^3}$, from which:

$$F \leq 0{,}3\frac{d^3}{h}.$$

In comparing this equation with equation (7) relative to a simple pole: $F \leq 0{,}06\frac{d^3}{h}$, we can deduce that: "If the force is exerted in the direction of the line of centers, then the resistance of a coupled pole is five times greater than that of a single pole."

4. *Strutted and Braced Poles.*—Finally, a means of reinforcing poles consists in bracing the telephone pole by a second pole, used as a strut or brace (Fig. 10) and

placed in such a way that the vertical plane formed by the whole unit contains the resultant of the horizontal efforts F. Two methods may be used to calculate the members to be used for braced poles.

First Method—This is the old classic method. If one resolves the resultant F into two others, AF' and AF'', following the directions respectively of the brace and of the pole, one will find that the former subjects the strut to compression forces, while the second tends to raise the pole out of the ground.

Keeping the notations previously adopted, let us call D the distance which separates the foot of the pole from the foot of the brace level with the soil. Comparing the triangles, we will have:

$$AF' = F\frac{\sqrt{h^2+D^2}}{D} = F\sqrt{1+\frac{h^2}{D^2}}.$$

$$AF'' = F\frac{h}{D}.$$

The force tending to uproot the pole and the compression force are then as small proportionately, all other things being equal, as the distance D between pole and brace is greater.

In general, the brace and the pole are solidly jointed by diagonal struts at X, giving added strength to the unit. What resistance is presented by such a combination as compared with the simple pole? To understand this, let us take a normal 12 m. (39.6 ft.) pole, braced by another like pole, the distance at the foot being 3.50 m (11.55 ft.) and the height above ground h being 10.20 m (33.6 ft.).

The force AF' will have the maximum value corresponding to 0.6 kg./sq.mm.and this will amount to 13,600 kg. The permissible force F which corresponds will be, therefore:

$$F = \frac{AF'}{\sqrt{1+\frac{h^2}{D^2}}} = \frac{13{,}610}{\sqrt{1+\frac{10{,}200^2}{3{,}500^2}}} \quad 4{,}420 \text{ kg.}$$

Be it well understood that this assumes the effective offsetting of the force tending to uproot the pole, expressed by AF'' (Fig. 10) in the direction of the arrow, which has the value:

$$F\frac{h}{d} = 4{,}420 \times \frac{10{,}200}{3{,}500} = 12{,}860 \text{ kg.}$$

Now, a simple pole of the same type resists no more than a stress of 80 kg. applied at the top of the pole; the braced pole, as we have seen, allows a pull of 4,420 kg., which is 55 times as great.

If the brace were not connected with the pole by a strut, but simply bolted to the latter at the top, as is often done, one would have a different resistance altogether. In the example of a 12 m. (39.6 ft.) pole, the brace would only support a maximum stress of 970 kg., and the corresponding force F would then only amount to:

$$\frac{970}{\sqrt{1+\frac{10{,}200^2}{3{,}500^2}}} = 315 \text{ kg.}$$

In this case the braced pole would only be four times as resistant as an ordinary pole and less resistant than a coupled pole. The advantage of an added stiffening with struts at X is therefore apparent.

One can make the brace still stronger by placing struts near the foot of the pole and brace. Another method to strengthen the unit is by increasing the distance D between the foot of the brace and foot of the pole. But this increases the difficulty in another way, since the greater distance of the brace from the pole is an incumbrance to people passing by the pole and is best avoided. The distance between pole and brace ought not to be much more than 3.5 m. (11.5 ft.), rather less.

Second Method: The unit can also be computed, admitting the use of a strut, by assuming that the pole and brace form one solid unit. In order to simplify the calculation of the moment of inertia, let us suppose that the pole and its brace have a certain cross section (Fig. 11). Let d be the one side of the cross section at the setting of the pole and brace, and D the distance between pole and brace at the level of the soil; we will then have as maximum permissible bending moment for the pole and its brace, both forming one unit:

$$R\frac{n'}{l'} = R\frac{d\,|(2d+D)^3 \quad D^3\,|}{6\,(2d+D)}$$

which can also be written in the form:

$$R\frac{d^3}{6} \times \frac{(2d+D)^3 - D^3}{d^2(2d+D)}$$

This is equivalent to saying that the brace multiplies the resistance of the ordinary pole by:

$$\frac{(2d+D)^3 - D^3}{d^2\,(2d+D)}$$

In order to make a comparison analogous to that which we just made in applying the first method, let us take: $d = 0.35$ m., $D = 3.50$ m., and we have:

$$\frac{(2d+D)^3 - D^3}{d^2(2d+D)} = \frac{(2\times 350 + 3{,}500)^3 - 3{,}500^3}{350^2(2\times 350 + 3{,}500)} = 60.$$

The brace is here 60 times more resistant than the simple pole.

Which of the two methods of computation is the better? Neither one nor the other, for neither is absolutely reliable. The second method, however, seems a little too optimistic, for it is based on the hypothesis that the pole and its brace form a rigid solid, which is not exactly the truth. One might even go so far as to develop an equation which takes account of all factors that come into play: rigidity of the upper joint, effect of the counter-strut, etc., but one would also have to take account of certain factors that only experience can give, and the greatest precision obtained would only be illusory at times and would have to be changed, depending on later experience with the poles.

We would advise, therefore, using the first method, which is simpler and more rapid in application. Moreover, it has the advantage that it immediately gives the value of the force tending to uproot the pole, an effort which is by no means negligible, for we have seen in the example given that it reaches a figure of more than 12,000 kg. for a horizontal traction effort of 4,420 kg.

Is it possible in practice to resist such a stress? Unfortunately, there are but few experiments available as to the efforts necessary to uproot a pole driven into the soil. We know, however, that the resistance to driving in of a pile, whose end does not go into rock, but into ordinary soil, such as is encountered in setting telephone poles, varies between 800 and 1,000 kg./sq.m. (160-200 lb./sq.ft.) of contact surface.

Now a pole of 12 m. length, having a diameter at the base of 0.25 m. (0.8 ft.), 0.24 m. (0.79 ft.) at the setting, set to a depth of 1.80 m. (5.9 ft.) into the soil, has a contact surface with the soil of:

$$1{,}80 \times 3{,}1416\,\frac{0{,}25 + 0{,}24}{2} = 1{,}38 \text{ m}^2.$$

Admitting, then, the maximum figure of 1,000 kg./sq.m. (200 lb./sq.ft.) for friction in the soil, one can count on

1,380 kg. increased by the weight of the pole itself, which is about 220 kg., giving a total of 1,600 kg. But this weight is increased in practice by setting the pole in a bed of stones, which is filled with cement. In this way one obtains a much greater contact area with the ground, whose rugosity itself gives room for a much greater coefficient of friction, and which can be assumed to be without difficulty near 2,000 kg.

Under these conditions, if one wishes to obtain a resistance to the uprooting of the pole of 12,000 kg. (not including the weight of the pole, which may be neglected) it is easy to compute that one must have a cylinder of masonry having a diameter x of:

$$1{,}80 \times 3{,}1416 \times x = 6\text{m}^2,$$

from which: $x = 1.05$ m.

In order to meet the necessary conditions for a good, firm setting, one must place at the foot of the pole a mass of stones, carefully piled up in form of a cylinder, having a thickness of 0.40 m. (1.3 ft.). This is commonly done anyway and offers an easy method of preventing the uprooting tendency of the pole. But the attention of the engineer should be drawn to this problem all the same, so that he may be saved disagreeable surprises from omission of such practice.

It has several times been proposed to determine the value of the resistance to the uprooting efforts by using the weight of an inverted cone of earth, having its summit at the base of the pole, whose sides have the inclination of the natural slope of the soil (the identical hypothesis which was used previously for the calculation of the anchorages). The application of this method gives practically the same results, although perhaps a little more favorable than is the case in reality.

There remains finally the tendency of the brace to force itself into the soil. In resistant soil one must not pass the limit of 0.800 kg. pressure per square centimeter (11.36 lb./sq.in.) (coefficient of security of 5). Now a pole used for a brace of 12 m. length has a base section of $\frac{3.14 \times 25^2}{4} = 490$ cm² (75.95 sq. in.). In the ordinary solid ground one can figure on resistance to uprooting $490 \times 0.800 = 392$ kg. If the strut is rigid, one can figure with a component of 13,610 kg. It is therefore necessary to set the lower end of the brace into a small concreted bed whose surface is large enough and sufficient, so that the pressure does not pass beyond the limit of 0.800 kg. If one had a compression component of 13,610 kg. corresponding to the maximum force allowed one would have to provide a massive area of $\frac{13{,}610}{0.8} = 17{,}012$ cm² or 1.70 m² equal to 18.19 sq. ft.

It is often recommended to connect the bases of the pole and brace in the ground by means of thick oaken planks, set between them and fastened in such a manner that they prevent the lengthening or shortening of the distance between the two poles. Two more planks can be used at either end of pole and brace to form real anchorages which are even more powerful than the ordinary earth and rock anchorages. While this plank anchorage and underground brace is difficult to set, it pays where poles and brace are exposed to excessive tension and traction forces.

Resistance of the Soil: Up to now we have only dealt with the resistance proper of the poles and supports, but there is another factor of which telephone engineers have to take account, and that is the resistance of the ground.

Since the pole resists bending moments, it compresses the earth at the setting of the pole. It acts then as if it were directly subjected to compression forces. It is therefore necessary to take the necessary precautions, so that the earth may not support a greater load than it can stand. Now, the ordinary type of resistant earth, embankments, rocky soil, gravel, etc., all of them the common type soil in which poles are set, are of such type that one can figure on loads of 0.800 kg./sq.cm. But in lighter ground and in embankments just finished, it is better not to figure on more than 0.200 kg./sq.cm. (2.84 lb./sq.in.).

Let us take a simple pole, as shown in Fig. 12, at whose head there is applied a horizontal force F; the bending moment which is exerted at the level of setting the pole will have the value Fh. This is balanced by an equal moment, coming from the resistance of the pole section set in the soil. We can admit: (1) that the pressure of a circular surface of diameter d and of height h' will be distributed over a useful area equal to: $\frac{\pi d}{2} \times h'$; (2) that the more or less equal forces, distributed over a circular area, can be replaced by one single force acting somewhere near mid-height.

If we designate this single force by F' applied at a height $\frac{h'}{2}$ or (h' having for its value 0.15) $(h + h')$, $\frac{0.176}{2} h$, we will have: $Fh = F' \times 0.088\ h$ from which: $F = \frac{F}{0.088} = 11.36\ F$.

Let us take an ordinary 12 m. pole at whose top there is applied a force of 800 kg. and we will have: $F = 11.36 \times 80 =$ ca. 910 kg.

The length in the ground h' is about 1.80 m; the diameter of the pole at the setting being about 0.24 m., the base of the pole being 0.25 m., the useful area of application on the soil will be: $\frac{\pi}{2} \times 180 \times \frac{24 + 25}{2} = 3330$ cm². The pressure will be: $\frac{910}{3330} = 0.273$ kg./cm², which in soil like that mentioned before is equal to a coefficient of security of 4. With a simple pole, then, provided the soil is properly banked up around the base of the pole, there is nothing to fear.

Let us now consider a coupled pole. The force applied at the top will be $5 \times 80 = 400$ kg, which gives for F: $400 \times 11.36 = 4545$ kg. The useful area at the base of the pole being the same, i. e. 3330 sq. cm., the pressure on the soil will then be: $\frac{4545}{3330} = 1.96$ kg./cm².

With lighter soils the pole will tend to bend right at the level of the ground; in stronger soil, greater resistance will be offered, but the coefficient of security will even then not be more than 3. In order to reach a coefficient of 5, the ground immediately at the foot of the pole will have to be strengthened with a bed of rock, so that the pressure will not pass beyond 0.800 kg./cm². The useful surface will then become, x being the diameter of the massive bed at the base of the pole: $\frac{\pi}{4} \times 180 \times x = \frac{4545}{0.800}$, from which: $x = 40$ cm.

In light soils the pressure must not pass beyond 0.200 kg./cm² and x will then be equal to 1 meter. It is evident that a coupled pole can rarely dispense with a solid bed around the pole setting.

Conclusions: It has been shown that these calculations are carried out quite differently from the methods

usually pursued in field work, where the forces to which the pole will be subjected are first estimated, and then the type of pole best fitted for the work is picked out.

The author believes that this is not a rational method; as a matter of fact, when a line of some importance is constructed, the length of poles being determined in advance by other considerations, which did not enter here, one has usually two, rarely three kinds of poles to choose from. One normal type is used for the straight run of the telephone line and a second reinforced type for curves.

What practical conclusions can the engineer in charge draw from these calculations which show him that at such a point he must set such a certain type of pole? As he cannot have all the necessary types of poles on hand, but in reality only two or three, he will simply choose the best one under the circumstances.

On the contrary, knowing that he has two types of poles at his command, having determined in advance the maximum tension and maximum force that each pole can stand, he can direct the places where to set his poles, choose his poles, designate the places where they are to be braced or coupled, etc. He can do all this because he has full knowledge of the facts and the only factor that he has to determine in his line will be the angle of deviation of the line at curves, in order to apply the coefficient

Telephone Cut-Off Relays

LAST year the French government asked for designs of long distance telephone cut-off relays, that might be adopted in the department for general telephone work. Among the numerous designs submitted, the one offerd by the French Thomson-Houston Company was judged the best both from the mechanical and electrical qualities as also from the point of simplicity of installing the relays in cable boxes.

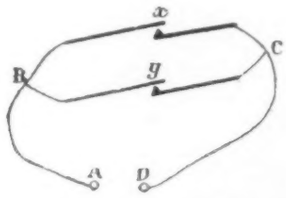


Fig. 1.—Method of Measuring Resistances.

Great care was given to the magnitude of the resistances of the contacts introduced by these relays into the circuits. Those relays which were finally picked out had values no greater than 0.05 ohms. In testing the relays and measuring them the following method was used:

Tho contacts were put in parallel, contacts x and y, whose resistance one wished to measure and these were connected to a Wheatstone bridge by two wires Ab and CD. Then three successive measurements were taken with the bridge, the one L, the contacts x and y being closed, the second M, contact x being closed and contact y open, the third N, contact x being open and contact y closed.

The resistances x and y are expressed by the equations:

$$x = M - L + \sqrt{(M-L)(N-L)}$$

$$y = N - L + \sqrt{(M-L)(N-L)}$$

The method is very exact, since the resistance of the wires AB and CD is of the same order as the resistances of the contacts to be measured.

The stability and endurance of the contacts was also tested out by subjecting the relays to sudden heavy current impulses during the resistance measurements, using the Wheatstone bridge contacts. The contacts were found to be very strong.

The relay which received first mention and of which some 18,000 have already been installed without giving trouble was the Thomson-Houston relay, shown in Fig. 2. Its form is that of an ordinary telephone conversation counting instrument. It is composed of an electromagnet whose armature is connected with a hook, which makes a cam wheel rotate by means of a ratchet wheel placed on a shaft.

In the position shown in the figure, the East and West branches of the circuit are directly connected to two contacts in parallel over each wire.

The relay utilizes a single direction of current. The first attraction of the armature brings the set of relay springs into working position, the second attraction brings

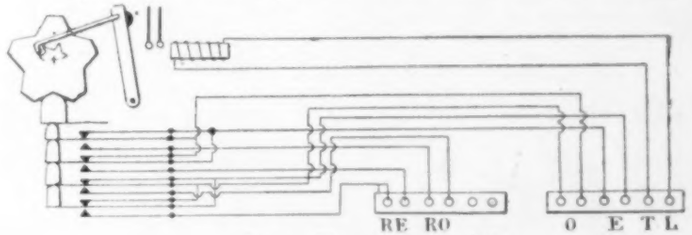


Fig. 2.—Thomson-Houston Relay.

them back to the rest position again. The resistance of the relay is about 615 ohms and it begins to function at 60 milliamperes. It is easily built into cable boxes, as the dimensions of the relay base are only 0.10 x 0.08 meters.—*Annales des Telephones.*

French Operator's Fourth Unit

Three units of American telephone operators are already in France and another unit is preparing to go. The course is from four to six weeks and the first requisite is a thorough knowledge of the French language, for the American telephone system in France not only links Gen. Pershing's headquarters with various points of military importance, but it also connects directly with the French government telephone system. They also take a short post-graduate course in New York before sailing.

Civilian clothing cannot be worn. They are under military restrictions.

The class that is now training probably will be ready to sail in June.

New York Financing

It is announced that the new issue of $25,000,000 stock of the New York Telephone Company will be bought by the American Telephone and Telegraph Company and held as a treasury asset. The issue will retire the same amount of notes. The American Telephone Company owns all of the stock of the New York Company and advanced the funds necessary for construction, taking the sub-company's notes therefor; in effect, these now are capitalized.

Telephone Patents Recently Issued

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

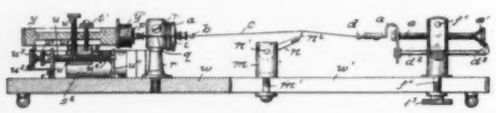
NOS. 1,249,154 and 1,249,155. Automatic Switch. Issued to J. L. McQuarrie, assignor to Western Electric Company, Inc., New York, N. Y. An electrically controlled test brush is moved to a selective position and the switching brushes then are moved mechanically to that selective position.

1,249,159. Party-Line System. Issued to T. G. Martin, assignor to Automatic Electric Company, Chicago, Ill. In an automatic exchange, the called station is rung automatically unless upon the line of the calling station, in which case a button at the calling station will ring the called station upon the same line. The system is two-wire without substation earth.

1,250,116. Automatic Switching System. Isssuel to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. The calling subscriber, having called through a trunk line to another office, may release all of the switches or may release only the switches of the distant office and then may select another line in the distant office without having released the switches of his home office.

1,250,192. Voice-Current Relay. Issued to C. D. Lanning, assignor, to O. B. Roberts, trustee, Boston, Mass. (Original application filed January 21, 1901.) The carbon cell electrode is under tension of a rubber band or similar member having a low rate of vibration and damped against transverse vibration.

1,250,579. Automatic Re-Ringing System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. In an automatic exchange, the response of the called line advances a side-switch from ringing position to speaking position, and afterwards the calling subscriber may shift the side-switch from speaking position to ringing position to re-ring the called station.



1,250,192.

1,250,583. Meter System. Issued to H. J. Herink, assignor to The Relay Automatic Telephone Company, London, England. In an automatic exchange, the meter control relay is affected by alternating current only, and circuits are provided for operating it when the called station responds.

1,250,854. Party-Line Metering System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. In a manual system, each station of a party line has a device to signal the number of the station upon the line, and at the central office there is a selecting switch responsive to the signals; the selecting switch connects to the line a different meter for each station upon the line and the meter is operated subsequently, each meter totaling the calls from its own station.

1,250,885. Automatic Switch. Issued to C. A. W. Hultman, Stockholm, Sweden. The travel of the switch brush is shortened by positioning the brush in the middle of the bank, then adjusting it by moving upwardly or downwardly as required and subsequently to right or to left as required.

Reissue 14,411. Searching System. Issued to R. H. Burfiend, assignor to Automatic Electric Company, Chicago, Ill. In a searching switch, the search is made first vertically to find a level having an idle trunk and then horizontally to find the idle trunk. The number of trunks thus searched over is greater and the time required is shorter. (67 claims.)

1,251,023. Relay Linefinder. Issued to H. E. Hershey, assignor to Automatic Electric Company, Chicago, Ill. Each line has a relay per trunk. A master switch designates an available trunk and when the receiver is lifted the proper relay is charged to connect the line to the designated trunk. A cut-off circuit disables all relays of any line when the line is called.

1,251,219. Meter System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. Deposit of a coin or preliminary operation of meter mechanism at the telephone enables a subscriber to obtain a connection through an automatic exchange but does not enable him to speak. The mechanism may be reset or the coin withdrawn but that act will release the automatic connection. In order to speak, the deposit of the coin must be made final, or the meter mechanism must be operated finally to effect registration upon the meter.

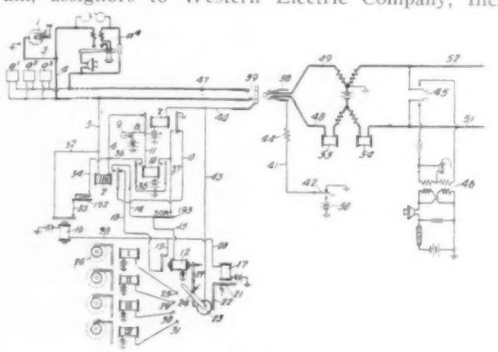
1,251,363 and 1,251,364. Signaling Circuits. Issued to B. Gherhardi, assignor to American Telephone & Telegraph Company, New York, N. Y. For composite telephone circuits, a single line is used for signals for many composite circuits and is sun-flowered at both ends to the several terminals.

1,251,503. Linefinder. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. But two wires are used in the multiple of a line in the linefinder bank.

1,251,504. Ringing System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. The system rings with a ringing commutator, but upon first connection with the line the ringing current is applied instantly without waiting for the commutator.

1,251,505. Busy System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. When a busy tone is received, the calling subscriber may wait and when the line called for becomes idle it is seized immediately and rung for the waiting subscriber's call.

1,251,543. Busy System. Issued to J. W. Lattig and C. L. Goodrum, assignors to Western Electric Company, Inc., New York, N. Y. In an automatic exchange, when several calling lines are waiting for the release of a busy selected line, the mechanism is such that when the busy selected line is released a connection will be given to but one of the waiting lines.



1,250,854.

1,251,544. Finder Starting System. Issued to A. E. Lundell, assignor to Western Electric Company, Inc., New York, N. Y. A starter wire extends from a group of lines to an idle linefinder, and when the linefinder has executed its preliminary movements in finding a calling line the starter wire is extended to the next linefinder.

1,251,545. Linefinder System. Issued to F. A. Lundquist, assignor to Western Electric Company, Inc., New York, N. Y. When in releasing a connection the calling loop is broken before the called loop is broken, the release of the final connector permits the called loop to operate a linefinder, ordinarily, but in this patent, mechanism is provided to prevent the operation of the linefinder by the holdover loop.

1,251,644. Meter System. Issued to H. P. Clausen, assignor to Western Electric Company, Inc., New York, N. Y. The meter does not operate when calls are made at a given rate, but operates to count calls which are made in excess of a given number of calls within a limited time.

1,251,985. Automatic Switch. Issued to F. A. Lundquist, assignor to Western Electric Company, Inc., New York, N. Y. The searching brushes drop by gravity over the face of a contact bank, and the contacts of any available circuit are displaced from normal to position them in the path of the falling brushes, so that the falling brushes pass contacts of non-available circuits and engage the contacts of an available circuit.

1,251,988. Automatic Switch. Issued to J. L. McQuarrie, assignor to Western Electric Company, Inc., New York, N. Y. The brushes are propelled by a compressed air piston, which is controlled by mechanical stop devices which in turn are set electromagnetically.

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

Arizona

FEARING that the Mountain States Telephone & Telegraph Company is contemplating the discontinuance of telephone service at Cochise, residents of that town filed a protest with the state corporation commission. Such action on the part of the Mountain States company could not be taken without permission of the corporation commission, however, and as no such application has been filed the commission is unable to take official notice of the protest. It is said the exchange at Cochise consists of seven telephones.

Application was filed with the state corporation commission by the Mountain States Telephone and Telegraph Company for permission to make a change in its toll rates.

For the purposes of defining telephone rates the country is divided into blocks seven miles square. Toll rates are made between these blocks and all distances in excess of 20 miles are charged at the rate of .8 cents per air line mile.

According to the application the Mountain States company desires to make the toll rate on distances more than 20 miles and less than 40 on a straight air line mile basis.

If the new rates are allowed, there will be no change on rates for 20 miles and less. Between 20 and 40 miles there would be some reductions and some advances. In excess of 40 miles there would be a slight advance due to a change in the base rate, from .8 cents to .9 cents per air line mile. To the customer, the change would be very slight, it is declared, but to the company it would be considerable.

California

The San Diego Home Telephone Company, T. A. Thompson, the Title Insurance & Trust Company and the Pacific Telephone & Telegraph Company have filed with the railroad commission an application for authority for the Pacific company to buy the property and franchises of the San Diego company, of Thompson and the title company in San Diego, El Cajon, La Mesa and National City for $650,000, and the San Diego company for authority to withdraw from the telephone business.

The application says that two telephone systems are at present being operated in the territory, one by Thompson and the title company as successors of the San Diego company, and the other by the Pacific company, thus subjecting the people to inconvenience and annoyance. With the consolidation of the two systems the Pacific company can better serve the public. The application also asks the commission to fix one set of rates which will apply to the service in all the territory.

The railroad commission has asked the Pacific company for a vast amount of detailed information, such as statements of the number of subscribers of each company, duplicate subscribers, all territory affected by each company, history of the telephone development in the county and much minor information.

Of the more important information desired is what the Pacific company intends to do with the automatic machines operated by the Home company and also what the Pacific company proposes to do in the way of issuing securities, if any, to pay for the property of the Home company and how it will secure such cash funds as may be necessary to effect the proposed consolidation.

The commission proposes to expedite the hearing and as soon as the Pacific company furnishes the information desired a date for the hearing in San Diego will be set.

Claiming that the rates fixed by the railroad commission, in its recent decision permitting the sale and exchange of telephone properties in San Bernardino, will provide an unreasonable and discriminatory charge for exchange service, the city of San Bernardino applied to the commission for a rehearing of the case.

The decision permitted the Pacific Telephone Company to acquire all of the property of the Home company outside of San Bernardino city and transferred all Pacific property in the city to the Home company.

This necessitated a schedule of exchange rates, which San Bernardino claims is too high.

Rehearing in the case was yesterday denied by the railroad commission. What steps will now be taken have not been decided. City Attorney William Guthrie said that the courts would probably be asked to review the case in so far as the toll charge is concerned.

The Valley Telephone Company, operating a system of rural telephone lines, eighteen of which connect the municipal boun laries of Holtville, Imperial county, and five at Brawley, where a central exchange is located, has applied to the Railroad Commission for a readjustment of its rates, saying that the present charges do not pay operating expenses. The company asks for a uniform rate for all customers, both stockholders and non-stockholders, and wants a discount of 25 cents a month included for prompt payment of bills. The company has 196 stockholders, of whom 160 are telephone users, besides 160 other patrons. All the company's lines are operated by the Pacific Telephone and Telegraph Company.

The Santa Monica Bay Home Telephone, which supplies telephone service to Venice, Santa Monica and the Sawtelle district of Los Angeles, has filed an application with the Railroad Commission for authority to issue $147,000 of bonds, to refund a like amount of bonds issued by the Home Telephone and Telegraph Company of Santa Monica and Ocean Park. The properties of the last-named company were acquired by the Santa Monica Bay Home Telephone Company about September 29, 1907, subject to a bonded indebtedness of $150,000. Of this indebtedness, $3000 has been paid, leaving bonds in the amount of $147,000 outstanding.

The Santa Monica Bay Home Telephone Company has an authorized bond issue of $500,000, of which $34,000 are outstanding. It now proposes to issue $147,000 of additional bonds to refund the $147,000 of

bonds issued by the Home Telephone and Telegraph Company of Santa Monica and Ocean Park.

The Postal Telegraph Cable Company applied to the Railroad Commission for authority to change the telephone rates between San Francisco and Sacramento to 25 cents for the first five minutes and 5 cents for each additional minute, instead of 25 cents for the first ten minutes and five cents for each additional minute. Permission was also asked to charge the same rates between San Francisco and Stockton. The existing charges to Stockton are 40 cents for the first five minutes and 20 cents for each additional minute.

Florida

Comptroller of the Treasury Warwick decides that the State Railroad Commission of Florida, which has fixed exchange rates for telephone service at one dollar a month, has no authority to set aside or interfere with government contracts in Florida which are at the rate of seventy-five cents a month. He has rendered this opinion to the secretary of commerce who made inquiry on the subject.

Idaho

The public utilities commission grants the application of the Mountain States Telephone & Telegraph Company permission to change the telephone classification of Pocatello from class C to class B, thereby increasing the business rates for telephone service in the city of Pocatello. The commission conducted a hearing into the rates following the application of the company to change the classification. A. W. Reed and some 36 other telephone subscribers in Pocatello filed a complaint objecting to the classification alleging the rules and changes were unreasonable and exorbitant. This is the first case of its kind involving an increase in rates to come before the commission.

The ruling of the commission permits an increase in the business telephone rates as follows: Individual line, from $4 to $5 per month; two-party line, from $3.50 to $4 per month; several party line, from $3.50 to $4 per month; private exchange trunk line, from $5 to $6 per month; mileage charges, from $4.20 to $5.50 per annum.

The schedule of rates filed by the Roseworth Telephone company between Castleford and Roseworth was approved by order of the public utilities commission.

Illinois

Notice that it would file a petition for a rehearing was filed in the office of Charles W. Vail, clerk of the supreme court, by the state public utilities commission in the case of the commission on the relation of the Chicago Telephone Company against the Postal Telegraph and Cable Company.

In this case the state public utilities commission on the complaint of the Chicago Telephone Company ordered the Postal Telegraph and Cable Company to desist from doing a telephone business in Illinois until it was given a certificate of convenience and necessity by the state public utilities commission, which was to decide whether it was entitled to such a certificate.

The Postal company appealed to the Sangamon circuit court, which decided for the Postal company. The circuit court held, and the holding was affirmed by the supreme court, that the state public utilities commission had no jurisdiction to issue such an order, but that it should, through the attorney general of the state, have brought injunction proceedings in the circuit court to restrain the Postal company from doing a telephone business until it had been granted a certificate of convenience and necessity by the public utilities commission.

The state public utilities commission issued orders suspending until October 28, 1918, pending investigation by the commission into the reasonableness of the same, the proposed increase in rates of the Virden Home Telephone Company of Virden, Macoupin county, the Illiopolis Telephone Company of Illiopolis, Sangamon county. The same order was entered in the case of the proposed increase in telephone rates at Pawnee by the Sangamon County Telephone Company and the Niantic Telephone company for Niantic.

The state public utilities commission issued an order approving the contract of the Lena Electric Light and Power Company of Lena for the joint use of transmission lines from Lena to Lanark and lines of the Pearl City Independent Telephone Company and the Stephensoun County Telephone Company and Pearl City Mutual Telephone Company at Pearl City.

The recent order of the state public utilities commission relative to telephone rates in Peoria shows there is to be no increase in rates of residence telephones, as was announced.

The only rates affected are those of four-party business telephones. The order provides that whenever the number of calls on such telephones is more than 750 a month the company may increase the charge up to a maximum of $36 a year. The present charge is $24 a year. There are only about 100 such telephones in use in Peoria.

The state public utilities commission denied the application of the Intertownship Telephone Company of DeKalb for a modification of rates and terms upon which physical connections may be made and calls interchanged between the subscribers of the applicant and the DeKalb County Telephone Company.

The commission ordered the companies to establish physical connections.

The Pitcher Telephone Company was authorized by the commission to increase its rates at Galena, East Dubuque, Stockton, Apple River, Scales Mound, Elizabeth and Hanover. A one-party business telephone hereafter will cost $24 a year and a one-party residence telephone $15. Slight reductions are made for rural telephones.

Rate increases from $1.50 to $1.75 a month for business telephones and from $1.25 to $1.50 for residence telephones was asked in a petition filed with the public utilities commission by the Arrowsmith Telephone Company, of Arrowsmith.

Indiana

The public service commission has authorized the United Telephone Company, of Bluffton, to issue $350,000 in two-year promissory notes at 6 per cent. The proceeds are to be used in discharging $240,000 of bills and accounts payable; to retire $30,000 in bonds

due January 1, 1918; to retire $40,000 in bonds due January 1, 1919, and to provide $40,000 for construction necessary in 1919.

The order says the commission does not commit itself to the wisdom of covering all accounts payable by stocks or bonds, but authorizes the two-year notes "in view of the fact that the telephone company is temporarily pressed during a period of general financial difficulty and that the total indebtedness of the company, after the note issue, will be from $250,000 to $290,000 less than the value of the plant, which the engineering staff of the commission found to be about $800,000."

The company serves Bluffton, Huntington, Marion, Hartford City and Montpelier and in the vicinity of those places.

In the case of the petition of the Citizens Telephone Company of Kokomo to issue $120,000 in two-year notes at 6 per cent interest, the commission has authorized $59,615.41 to be sold at not less than 98, the proceeds to be used in paying debts due two Kokomo banks; $39,615.41 to be used in construction facilities in Kokomo; $60,384.59 to discharge, par for par, accounts payable to the Central Union Telephone Company and the Western Electric Company. The commission refused to let notes, to pay these latter companies, be issued at a discount.

"Accounts payable to them," says the order, "are for materials and services on which they have already collected profit. Such refunding should be at par for par."

E. M. Van Nostran, of the Wabash Home Telephone Company, has filed an application for an increase for local rates with the state utility board.

The company asks for an increase of 50 cents a month for single-line business and residence telephones and 25 cents a month for party line service. Under this proposed revision, rentals would be $2.50, $2.00 and $1.50 a month.

According to a report of an engineer who recently inspected the local plant and investigated its assets, the valuation of the company's investments was placed at $206,000. As the state utility board requires that the concern set aside 14 per cent of this amount annually, before dividends may be declared, the officials of the company declare that unless they are granted the increases sought they will be unable to pay further dividends.

The public service commission has granted Warsaw an increase in telephone rates of 25 cents per telephone, but also granted a decrease of that amount to the consumer who pays his telephone bills by the 20th of each month for which the service is given. It also granted a 75-cent quarterly increase but granted a decrease in same amount if bills are paid quarterly in advance, by the 20th day of the quarter in which the service is rendered.

The Central Union Telephone Company and the Home Telephone Company of Lafayette have filed a petition with the public service commission asking permission for the Lafayette company to buy the local business of the Central Union at Lafayette for $55,000.

An increase of telephone rates at Peru is asked in a petition filed with the public service commission by the Central Union Telephone Company. Present business rates of $3 a month and residence rates of $1.50 a month are to be raised respectively to $3.50 and $2 a month if the petition is granted.

An increase of approximately 25 per cent in rates is asked in a petition filed by the German Mutual Telephone Company of Rochester, Ind., with the public service commission. Abnormal operating costs are given as the reasons for the need of more revenue.

The Vigo Mutual Telephone Company, of Libertyville, has filed a petition with the public service commission for authority to increase its rates.

The Martinsville Telephone Company, of Martinsville, today filed a petition with the public service commission of Indiana, asking authority to increase its rates. Wartime increases in operation, the company's inability to collect some of its bills and other exigencies make the increases necessary, the petition says.

Rural rates raised by order of the public service commission affects about 150 subscribers of the Alexandria Telephone Company. The new rates of $1.35 per month per month gross, $1.25 net and went into effect May 1.

Interstate Commerce Commission

Reports from sixty-one telephone companies, with annual operating revenues in excess of $250,000, showed a decrease of $3,127,617 in operating income for 1917 below 1916, the Interstate Commerce Commission reported.

The companies have in operation 7,707,294 stations.

Operating revenues were $34,800,338 and operating expenses $31,809,089. This leaves a net operating revenue of $2,991,249, which was an increase of 3.1 per cent over 1916.

Uncollectable operating revenues amounted to $1,435,435.

Kansas

The Arkansas Valley Telephone Company will increase rental rates on business telephones in Larned, beginning June 1. The new rates have been approved by the state public utilities commission, and the raise authorized. There is no change in the rate on residence telephones, only where desk or extension telephones are used.

The present rate for individual business telephones is $2 per month. The new rate is $2.35 per month for wall telephones; 25 cents per month extra for desk telephones; and $1 per month for extension sets with bell. The extension desk telephones in residences with bell will cost 75 cents per month extra; residence extension wall sets 65 cents per month.

The owner of the Home Telephone Company at Highland, a Mutual Company, has applied to the utilities commission for a raise in rates.

Louisiana

The Louisiana railroad commission, after an extended hearing, has granted a slight increase in rates to the Southern Telephone Company, owning and operat-

ing a system of independent telephones in the western parishes of the state.

The revenues of the company says it is impossible to better the service on the present rates, and insist that even as good a service as is now given cannot be maintained.

The railroad commission has authorized the company to make a slight increase in rates on condition that there be a betterment in service.

Michigan

With a decrease in revenue of more than $600,000 and a net loss in the state of $133,000 for 1917, the Michigan State Telephone Company is compelled, according to General Manager G. M. Welch, to ask for increases in telephone rates in every city and town in Michigan, or a sufficient increase to meet present conditions, which will mean at least $1,500,000.

The Valley Home Telephone Company and the Moore Telephone System will appeal to the railroad commission for permission to raise the rates for telephone service in Caro. The reason given is increased cost of labor and materials necessary to maintain and operate the systems.

Negotiations are now in progress between the managers of the telephone companies and a committee of Caro Business Men's Association in an attempt to secure connecting service between the lines of the two concerns without extra charge, and failing at that, the state law will be invoked to compel the connection and service on a special toll basis.

The city of Holland has started formal action to secure physical connection of the two telephone systems in Holland. Some time ago the council asked City Attorney McBride to begin proceedings to bring this about.

To bring the matter up formally it was necessary to have two citizens sign the necessary papers, one of whom had a Bell telephone and one a Citizens. So Mr. McBride signed it himself as a citizen and also had Isaac Kouw sign it. The petition was sent to the State Railway Commission.

Minnesota

Field work on the state telephone valuation was begun in Martin county when a crew headed by Charles E. Hoy of Minneapolis as chief, started to make a detailed inventory of all the property of the Tri-State Telephone and Telegraph Company, devoted to the long distance or toll service. The task of appraising the value of the toll lines in Minnesota was imposed upon the State Railroad and Warehouse commission by the last legislature, and the commission entrusted the actual work to D. F. Jurgensen, its chief engineer.

The work of appraising the Northwestern Exchange Telephone Companies' properties in Martin county was completed in 1917. The appraising of all toll lines properties of both companies will therefore have been completed in this county as soon as the crew now at work has completed its inventory.

Mr. Jurgensen has about 10,000 miles of toll pole lines extending to every corner of the state to enter upon his reports, and as these must include a record of the condition of every unit entering into telephone construction, and that to the minutest detail, the task is an exacting one. If a sufficient number of capable telephone men will be available this season, it is expected that the outside work will be finished this year.

The notes now being taken will not only give the commission a complete record of the telephone property in the state, but the data also will form a basis in determining the reasonableness of the long distance or toll rates prevailing in Minnesota, which have been subject to some criticism.

In the matter of the application of the Northwestern Telephone Exchange Company to purchase certain properties of the Tri-State Telephone & Telegraph Company; and the application of the Tri-State Telephone & Telegraph Company to purchase certain exchanges and toll lines in Minnesota of the Standard Telephone Company; and the application of the Tri-State Telephone & Telegraph Company for permission to purchase certain telephone exchanges and toll lines of the Northwestern Telephone Exchange Company in the State of Minnesota.

It is ordered that the Northwestern Telephone Exchange Company is authorized and permitted to purchase the following described properties situated in the State of Minnesota:

Those certain telephone exchanges located at Badger, Barnum, Bloomington, Braham, Brainerd, Brook Park, Cambridge, East Grand Forks, Excelsior, Foley, Graceville, Grandy Greenbush, Hinckley, Isanti, Lindstrom, Litchfield Milaca, Minneapolis, Moose Lake, Mora, North Branch, Ogilvie, Onamia, Ortonville, Pine City, Princeton, Rush City, Thief River Falls, Wahkon.

In addition to the above, telephone property furnishing exchange service in Hopkins, Robbinsdale, Columbia Heights, and St. Louis Park from switchboards located in Minneapolis; Grasston from an exchange at Braham and Barrows and Merrifield from the Brainerd switchboard.

That said applicant is also authorized to purchase the majority of the capital stock and such other obligations as said Tri-State Telephone & Telegraph Company owns in the following companies, to-wit:

Becker-Mahnomen Company, operating exchanges at Detroit, Callaway, Ogema and Mahnomen.

Zenith Telephone Company, operating exchanges at Duluth, Cloquet and Carlton, with exchange service in Proctorknott from the Duluth Board.

Stevens County Telephone Company with an exchange at Morris.

Roseau Telephone Company with an exchange at Roseau, Minnesota.

Clover Belt Telephone Company, operating exchanges at Sandstone and Bruno, Minnesota.

That said applicant, the Northwestern Telephone Exchange Company is authorized to purchase from the Tri-State Telephone & Telegraph Company all toll lines situated north of a line described as follows, in the State of Minnesota:

Commencing at the Northeast corner of the county of Washington, westward along the northern boundary of the county of Washington; thence southerly along the western boundary of the county of Washington; thence westerly along the northern boundary of the county of Ramsey to the northwest corner of said county; thence southerly along the westerly boundary of Ramsey County to Dakota county; thence westerly along the northern boundary line of Dakota, Scott, Carver, McLeod, Renville and Yellow Medicine counties to the westerly boundary of the State; together with the toll exchanges located at St. Cloud, Crookston, Moorhead, Willmar, and Appleton, in the State of Minnesota.

Said toll lines are more particularly designated and described by that certain map or plat on file with this Commission in said hearing.

That the sale and transfer of said properties is authorized subject to the conditions and limitations hereinafter set forth.

That the Tri-State Telephone & Telegraph Company is hereby authorized and permitted to purchase from the Northwestern Telephone Exchange Company the following described properties; the telephone exchanges situated in the following cities and villages:

St. Paul, St. Paul Park, White Bear, Lamberton, Bird Island, Olivia, Renville, Tracy, Owatonna, Austin, Faribault, Le Sueur, Northfield, Mankato, Winona, Stillwater, North St. Paul, Savage, Granite Falls, New Ulm, Redwood Falls, Sleepy Eye, Windom, Albert Lea, Eagle Lake, Glenville, Madison Lake, Red Wing Witoka.

The Tri-State Telephone & Telegraph Company is authorized and permitted to purchase from the said Northwestern Telephone Exchange Company, all of its long distance lines, long distance exchanges, long distance franchises, rights of way and

long distance business located in the State of Minnesota, south of the northern boundary lines of the counties of Washington, Ramsey, Dakota, Scott, Carver, McLeod, Renville and Yellow Medicine, excepting only its through toll lines extending from the Twin Cities southward through Red Wing, Wabasha and Winona to La Crosse, Wisconsin; and eastward from the Twin Cities to Wisconsin via Hudson; southward from the Twin Cities into South Dakota via Mankato and Worthington and southward into South Dakota; and from Granite Falls via Marshall and Pipestone, which are reserved by the Northwestern Telephone Exchange Company for handling of through or interstate business. That the general location of the toll lines so purchased is shown in purple upon the map or blue print on file with the Commission in the said matter.

That the Tri-State Telephone & Telegraph Company is hereby authorized and permitted to purchase from the Standard Telephone Company the properties described as follows, to-wit:

Its entire telephone exchange property, franchises, and radiating rural lines, comprising its local exchanges at Preston, Fillmore County, and Caledonia, Houston County, Minnesota; its long distance lines and stations, franchises, and rights of way extending from Preston to Mabel; from Mabel southward to the state line and from Mabel to Caledonia; from Caledonia southward to the State line and from Caledonia northeastward via Brownsville to the State line on its line to La Crosse, all as shown on a map on file with the Commission.

That the said permission for the purchase of the exchange and certain properties is made upon the express conditions and limitations stated, as follows, to-wit:

First—That the Northwestern Telephone Exchange Company in all instances in which it is purchasing the majority or controlling interest in any telephone property or exchange by the purchase of stock or other obligation from the Tri-State Telephone & Telegraph Company, shall offer to purchase from any holder of any stock in any of said companies, the stock of said holder at the same figures as said Northwestern Telephone Exchange Company shall pay for the majority of said stock in said companies, and shall upon the determination of the amount to be paid to the Tri-State in any one of said exchange plants, mail to the last known address of each and every holder of capital stock of said telephone company, a notice stating the price paid to the Tri-State Telephone & Telegraph Company, and offering to pay to said stockholders for his stock the same price should said stockholder elect to accept said amount and surrender his stock within a period of 90 days from the mailing of said notice.

Second.—That on and after July 1, 1918, all toll rate schedules, rates and routings of the Tri-State Telephone & Telegraph Company as are now in effect, shall be cancelled and thereafter all toll messages over the lines of either of the companies which are parties thereto shall thereafter be handled upon the schedules, rates and routings, as now in effect, except as may be hereafter amended by application to this Commission, on the lines and system of the Northwestern Telephone Exchange Company until thereafter changed by approval of this Commission.

Third—That as to all exchange properties transferred by virtue of this order, service shall be continued under the rules, rates and regulations now in effect as to those exchanges and shall continue in effect until at such time as the company operating the same shall obtain permission from the Commission for amendments, changes or discontinuances as the case may be.

Fourth—That the transfer of the legal title to any of the exchange properties in this order described shall in no manner affect the kind, character or extent of service that shall hereafter be furnished from said exchange properties irrespective of the ownership of the same; that all changes, modifications or discontinuances of service shall be submitted for approval to the Commission, and the Commission shall have full power to order such service or create exchange areas as the Commission may deem for the best interests of the public; and the said Commission shall have full authority to order the maintenance of trunk lines between the various properties of said companies for the purpose of either toll service or exchange service.

Fifth—That said purchasers shall accept said properties subject to all contracts, conditions and legal obligations which are imposed upon them under their present ownership.

The date of transfer of the legal title shall be July 1, 1918.

The Bigelow Telephone Exchange Company is authorized to place into effect as of July 1, 1918, the following schedule of rates for local exchange service at Bigelow, Minnesota:

Individual Line Business	$2.25 per month.
Individual Line Residence	1.25 per month.
Rural Multi-party	1.25 per month.
Connecting company rural switching	3.50 per station per annum.

It is ordered that the Bigelow Telephone Exchange Company install a system of accounting and make such annual reports as are prescribed by the Commission.

Hearings will be held on the applications for increased rates of the Armstrong Telephone Company at Truman, Minn., June 11; of the Madelia Telephone Company at Madelia, Minn., June 11; and of the Arco Telephone Company at Arco on June 13.

Missouri

The Southwestern Bell Telephone Company has filed application with the public service commission for permission to increase the rates for telephone service in the Chillicothe exchange. The company states that the revenue is less than the actual cost of furnishing service. It is estimated that the new rates as asked for will increase the revenue approximately $8,000 annually. The rate as asked for increases the business telephones $1.00, making it $3.50 per month, and the residences telephones 50 cents, making the individual line $2; two party line $1.75 and four party line $1.50. The company asks that the new rate go into effect June 1.

The Home Telephone Company, operating all telephones here at Excelsior Springs, has asked an increase in rental rates of the Missouri Public Utilities Commission. The present rate is $2.50 a month for business telephones and $1.25 for residences. The rates to be asked are $3.50 for business telephones and $2 for residences. The company now has nearly fifteen hundred subscribers.

Nebraska

Representatives of the Nebraska Telephone Company and of the Farmers' Telephone Company of Dodge county held conference with the railway commission over the handling of toll messages between Fremont and other towns of the county. The Fremont exchange belongs to the Bell, while the farmers' corporation has exchanges at Scribner, Snyder, Dodge and Webster, and toll lines connecting them with each other and with Fremont. The Bell refuses to furnish connections at Fremont, unless the toll messages are routed over its wires. The Farmers' Company toll rate is cheaper than the Bell, and its subscribers insist on routing the messages over its lines.

New York

The public service commission, second district, will investigate as soon as possible the complaint of the municipal authorities of Buffalo against the New York Telephone Company for an adjustment of rates.

The New York Telephone Company has filed its answer to the city's complaint. The company takes the ground that "no hearings should be held nor should any action be taken by the commission until after the actual consolidation of the properties of the respective companies in Buffalo is perfected, and opportunity afforded for the accumulation of data showing the results of operation under said consolidation in their relation to the operations of respondent in other portions of its territory in this state with which the service and rate in this city are necessarily inter-related as parts of a unified whole."

The answer alleges that the rates, rentals and service charges are reasonable and are not in violation of its franchise as modified on the merger with the Federal Company.

Mayor Fitzgibbons of Oswego has filed with the commission a complaint against the New York Telephone Company, asking for an investigation of the increase in telephone rates on or about December 1. It is alleged the rate increases are unwarranted, unreasonable and unfair and that the increases were not based upon a reasonable return upon the physical value of the property.

The New York Telephone Company filed with the public service commission changes in local and joint toll tariffs, effective May 21, and affecting a few localities in nearly every county except New York city. Several hundred changes are made in the new tariff sheet and in many instances there is a reduction in toll charge between points. The increases in rate as a rule do not exceed five cents and are occasioned principally by a transfer of localities affected from special rate sheets to block rate sheets. Rates changed are in rural communities and points involved are those in which toll calls are few. Changes do not affect toll rates in larger cities except in a few instances.

The State Telephone Company of Coxsackie, N. Y., has been authorized by the public service commission to execute a mortgage amounting to $20,000, the proceeds to be applied toward the discharge of indebtedness outstanding on October 1, 1917. The mortgage is for $60,000.

The New York Telephone Company has applied to the New York Public Service Commission for permission to issue $25,000,000 additional stock. A hearing will be held at Albany on May 3. The purpose of the issue is to reimburse the parent company, the American Telephone and Telegraph Company, for advances made in the past.

North Carolina

The Asheboro Telephone Company (Independent) filed an application for permission from the corporation commission to increase its charges for local exchange service stations to the extent of 50 cents per month for business telephones and 25 cents per month for residence stations. E. H. Morris is the president of the corporation.

The hearing before the commission in the case of the application of the Southern Bell Telephone Company for increases in telephone rates in Charlotte, Asheville, Raleigh, Winston-Salem, Greensboro, and Wilmington and various other exchanges was set for May 28.

Ohio

In an individual opinion delivered in the Cleveland Telephone Company rate case, Judge Thomas A. Jones of the supreme court holds that power to regulate rates of utilities rests with the public utilities commission of Ohio, and that Cleveland exceeded the grant of the home rule constitutional amendment in writing a regulatory provision into its charter.

Judge Jones quotes President Wilson's letter to Director General McAdoo on February 19 to show that public utilities "are not merely of local concern but are co-related with state and national interests."

The supreme court is divided on the question involved in the Cleveland case, of whether the utilities commission or a home rule city has rate fixing power. The issue is of broader application than the single Cleveland case, and the legal debate is being watched by Ohio charter municipalities generally.

The Central Union Telephone Company has filed a schedule with the Public Utilities Commission increasing its Toledo rates on residence telephones effective June 1. No increases in other classes of service are included.

Two-party residence telephones are to be increased 50 cents a month; and individual residence service will be increased 75 cents a month under the schedule. The present residence rate is $1.50 a month for two-party service and $2.25 for individual residence service.

The city of Toledo and Mayor Schreiber personally filed protests with the commission against the proposed increased rates of the Central Union Telephone Company.

Valuation of the Toledo property of the Ohio State Telephone Company will begin on June 4. Thomas E. Green, valuation expert of the commission, has been assigned to do the work.

Upon this valuation may depend largely whether Home Telephone rates will go up or remain where they are. The company filed a schedule for increases. The city sought the application.

What public utilities commission officials say is the first instance of a telephone rate in Ohio being fixed at some figure not a multiple of 25 was announced for Logan. The new rates were made following consolidation of two companies. City residence telephones will be $1.35 and rural telephones $1.85. All other rates in the state are said to be divisible by 25, although no reason for making them so ever has been advanced.

The state utilities commission of Ohio has granted the Cleveland Telephone Company permission to issue $3,000,000 of 6 per cent notes at par for the purpose of retiring notes outstanding and due May 10. The company has made application for a total issue of $8,150,000. Action was deferred on the remaining $5,150,000.

Oregon

Change in the application of the new air-line toll system adopted in Oregon by the Pacific Telephone & Telegraph Company are sought by the Portland city council before the public service commission.

The new system was put into effect in Oregon following its inauguration in other Pacific Coast states. The charges are based on the air-line distance between the two points used in telephone conversation. This plan, it was held, would eliminate discrimination between points and place all cities on the same basis.

The city officials have no objection to the new plan, agreeing that it is fair and equitable, but their contention involves its application. Under the present plan they claim that the company's revenue on business originating in Portland has increased $2,000 monthly.

The Yamhill Telephone Company is instructed to establish a 24-hour continuous service, instead of a 15-hour service, in an order of the public service commission. Other outstanding features of the order are as follows:

Sufficient revenue to meet the additional expense is provided by an adjustment of rates which at the same time eliminates several features of unfair discrimination which appear on the old schedules. Hereafter stockholders must pay the same rate as non-stockholders and business houses producing heavy traffic upon the lines must pay higher rates than residences. Provision is also made for a distinction in charges between multi-party lines and those lines upon which the number of connections is limited. The company is required hereafter to construct and own all lines for service to patrons in the town of Lamhill, unless in special cases such requirement might be found to be unreasonable, and to own or rent all telephone instruments connected directly to its lines within the city. The latter provision permits any subscriber to enjoy the privilege of services from this company without, as in the past, having to make permanent investment in telephone equipment.

Pennsylvania

The Westmoreland and Fayette Telephone Company, operating in Perry township, Fayette county, and Rostraver township, Westmoreland county, has filed a new tariff of rates, with the state department at Harrisburg, effective June 1, making an increase in the rate for residence party line telephones from $18 to $20 a year. Effective the same date the rate of $12 a year, which has heretofore been extended to public service corporations, will be discontinued.

New Jersey

The New York Telephone Company filed with the Public Utility Commission a revised schedule of rates arranged to reduce its revenues in New Jersey by $800,000 a year. This was in accordance with an order of the board, following the telephone-rate investigation concluded last November.

The New York company announced a plan of consolidation of all the Bell Telephone interests of New Jersey, under which the New York Telephone Company, the Delaware and Atlantic and the Atlantic coast companies will be merged into one operating concern.

By this plan, and the practice of other economies, the Bell interests expect to overcome the loss of revenue resulting from the lower rates. Otherwise, it was said, it may be necessary to apply for permission to exact a surcharge to meet emergency conditions during the war.

Washington

Now that the supreme court has held that the Home Telephone Company of Spokane cannot raise its rates from $2 to $3 a month, thus setting aside a franchise rate, but must secure such abrogation through the public service commission, it is stated that a formal application will be filed by the Spokane company within a short time. There is now pending before the commission a formal complaint against all telephone rates in Spokane. This was filed by the Crystal Laundry Company in 1917, but was held up pending the ruling of the supreme court.

West Virginia

The Silver Hill Telephone Company, operating in Wetel and Marshall counties, asks to increase its regular subscriber charges from $6 to $8 annually, and toll charges from 5 cents, 10 cents and 15 cents to 10 cents, 15 cents and 25 cents.

The Fleming Telephone Company asks authority to withdraw the following schedule: business telephones, single line, $25; two-party line, $20; and four-party line, $15; and residence telephones, single line, $20; two-party lines, $15; four-party line, $12 annually; and to substitute the following schedule: business telephones, single line, $36; two-party line, $30; four-party line, $24; residence telephones, single line, $25; two-party line, $20; and four-party line, $15 a year.

The Romney Consolidated Telephone Company, operating 1,300 miles of wire in Mineral, Hampshire, Hardy and Grant counties, petitioned the public service commission for permission to increase its toll rates.

The Limestone Telephone Company was granted an increase in rates in White Sulphur Springs, Ronceverte, and Lewisburg by the public service commission.

Wisconsin

The Inter-County Telephone Company and the Wise Telephone Company, Birchwood, have each filed a petition with the railroad commission asking for advanced rates on the lines between Birchwood and Stone Lake.

Wyoming

A petition for an increase in the rates of business telephones in Sheridan, containing the signature of between 97 and 98 per cent of all the subscribers affected, was forwarded to the Wyoming Public Service Commission.

The petition asks that the rate for the one-party business telephone be increased from 4 to $5 per month and that the two-party rate be advanced from $3.50 per month to $4.

Three hundred eighty-eight telephones are affected.

No change in the rates for residence telephones is sought, of which number there are more than 600.

Lafayette, Ind., Talks Merger

At a meeting of the stockholders of the Lafayette (Indiana) Telephone Company, ninety-two per cent of them voted to buy the Central Union Telephone Company's holdings in Lafayette. This means that the two companies will merge as far as local conditions are concerned.

A purchase price of $55,000 was agreed upon, the Lafayette company to get everything but the office equipment in Lafayette and the substations. The Central Union Telephone Company will continue to operate the long distance branch, but local telephones are to be a thing of the past as far as it is concerned, the Lafayette company alone having local service.

All the details have not been settled as yet and F. D. Cuppy, manager of the Lafayette company, estimated that it would take from 60 to 90 days to perfect the plans. This is due to the vast amount of work necessitated by the merger.

The plan, briefly, means that citizens of Lafayette having Lafayette telephones can now talk over the combined wires of both the Independent system and the Bell system to any point in the United States.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers are Doing to Advance the Art

Stromberg Markets New Type of Key

The engineers of the Stromberg-Carlson Telephone Manufacturing Company hold that the reasons for placing the cord lamp signals in a central energy switchboard in the keyshelf also apply to the location of the clearing-out signals in a local battery switchboard and that the proper place for all clearing-out or supervisory signals is in the keyshelf.

They say that when the usual form of clearing-out drop is used and placed in the jack opening beneath the line signals it is difficult for the operator to see the clearing-out drop shutters when they fall, because a certain number of them are screened by the cords put up for connections at the time. This condition frequently causes "tie-ups" because the operator does not note the signal as promptly as she should. Furthermore, when clearing-out drops are used the operator is apt to pull down the wrong connection because of error in reading the signal.

To remedy these conditions the Stromberg Company has designed and is now furnishing on the new type switchboards its new No. 169 key in which all of the visible parts of the cord circuit equipment, except the plugs and cords, are combined in a single apparatus unit.

The New S-C Key.

The accompanying illustration shows the general design of the key and the relative positions of the two clearing-out signals, the ringing and listening key and the ring-back button. The clearing-out signals are arranged to operate independently of each other and either or both of their shutters may be restored to normal position by a single movement of the listening key lever.

It is said that this key provides for faster and better service on rural line switchboards because it is unnecessary for the operator to waste her time in restoring the clearing-out signals after the completion of calls. The signals are always in plain sight and cannot be hidden by the cords since they are between the cords and the operator. Aside from these advantages the clearing-out signals and the cords which they control are closely associated and directly in line with one another, so that the operator is less liable to take down the wrong connection and disturb parties who are conversing.

The key is well made and so simple in its mechanical elements that it is practically unbreakable and trouble-proof.

Further information regarding this new key and its application to local battery switchboards can be obtained from any office of the Stromberg-Carlson Telephone Manufacturing Company.

The Telephone, Electric Light and the Farm

Nothing takes place without a definite cause to bring it to pass. Cause and effect is what scientific people call it, and there are many evidences of the working out of this law in every phase of life, commercial and otherwise.

Present-day telephone development is a concrete example. It did not, like Topsy of Uncle Tom's Cabin fame, just grow. It is the effect of a cause conceived in the minds of groups of men here, there and everywhere, who have devoted their lives to spreading the gospel of the use of the telephone to the most remote parts of the country.

It is a fact that most time and labor-saving devices that have a universal application are first found in the larger centers of population. This has been the case with the telephone. In the first ten years after its invention in 1876, the telephone was to be found in use, to a limited extent, only in business houses and between towns not very far apart. As the then existing telephone companies gradually became impressed with the wonderful possibilities that might come with the increasingly popular use of Alexander Graham Bell's invention, pay stations began to be placed in residential districts, usually in the more prominent neighborhood stores. Then as telephone engineers went on with their unceasing labor of perfecting the means for telephone communication, the cities and larger towns came to use the telephone in practically every commercial enterprise, and in a great number of private homes.

In these first years, no one though of the rural communities. Farms were far apart and the expense entailed in the construction of telephone lines between farms was considered prohibitive for the simple reason that it was not thought that the farmer had enough use for the telephone to make it pay.

Fortunately for the farm folk, however, there were men who knew the farmer, knew his needs, and knew of the dreary isolation of farm life, which was driving the sons and daughters of the farmers to the cities. These men organized farmers' telephone companies, and slowly but surely, as a direct result of the energy that seems to be characteristic of men engaged in developing the use of the telephone, the idea spread to all parts of the country. On January 1, 1918, there were 12,000,000 telephones in the United States, of which 3,000,000 were in rural communities helping to make living and business conditions better for the farmer.

Although the telephone and electric arc and incandescent lamps were invented within three or four years of each other, the use of electric lighting has not, by any means, made the strides that the telephone has. Up to a very short time ago hardly a farmer could boast of electric lights, while many a city family had a telephone long before it had electric light in the home. True, farms along lines of electric interurban railroads could often

buy current from the operating companies, but the point is that the comparatively slow development of electric lighting has been due to a lack of concerted and well-directed effort to put it across.

There is now an opportunity for the same men who were the leading spirits in putting the telephone on the farm, to put electric light on the same plane of development. They have had dealings with farmers long enough to know that the farmer who was progressive enough five or ten years ago to have a telephone installed is open minded to further innovations. He need only have the farm electric power and light proposition presented to him properly in order to become a convert to this newer way of making the farm more attractive as a place to live on, and of saving time and labor in farm work.

In the campaign being waged at present to put electricity on every farm, the Western Electric Company, which was a vital factor in the rural telephone movement, is playing a prominent part. It has placed on the market a number of electric power and light outfits that meet the needs of farms of every size. These outfits not only produce current for lighting the farmhouse, grounds, and outbuildings, but they also furnish electric power for operating electric motors, water systems, cream separators, milking machines, feed cutters, washing machines, vacuum cleaners, irons, fans, sewing machines, and other appliances for home and farm. A sales agency should be especially attractive to telephone men in the rural communities, as the terms under which the power and light outfits are being marketed through sales agents are extremely liberal.

A number of managers of the small telephone companies are already enrolled in this work and are finding it profitable. Others who can give satisfactory references as to their commercial ability will find the field an inviting one. The development of electricity on the farm is going to be a tremendous one during the next few years and there seems to be no reason why the telephone man should not become an active factor in carrying it out.

Platinum

Platinum is scarce in this country, and is selling around $100 per ounce, which is five times the price of gold. Russia for long has produced the bulk of the world's supply from the Ural Mountains, but the war has interfered with the business. However, a patriotic and enterprising American mining engineer, F. W. Draper, arrived at San Francisco a few months ago from Russia having over $2,000,000 worth of the metal which he sold to the U. S. government at cost. The consignment, which he guarded carefully all the way from Petrograd, weighed nearly a ton and was in nine boxes each weighing 215 pounds. Each box was heavy enough to discourage a thief, yet was only about seven inches cube, or say the size of a five-pound box of candy.—University of Colorado *Journal of Engineering.*

The Geological Survey authorizes the following:

According to figures compiled by J. M. Hill, of the United States Geological Survey, only 605 ounces of crude platinum was sold by placer mines in 1917. This is less than the sales in 1916 by about 100 ounces. The imports of crude platinum amounted to 31,921 ounces, not counting the 21,000 ounces of Russian crude platinum which was received by the Government late in December.

During 1917 refiners made about 33,000 ounces of platinum, 4,800 ounces of palladium, 833 ounces of osmiridium, and 210 ounces of iridium, which can be called "new metals." Of this amount about 7,400 ounces probably originated from domestic materials.

The saving of scrap platinum of all classes resulted in much larger recoveries of secondary platinum metals than in previous years, a total of 72,000 ounces being recovered, as compared with 48,000 ounces in 1916.

New Kellogg Bulletin on Magneto Switchboards

A new edition of a bulletin on magneto switchboards is being distributed by the Kellogg Switchboard and Supply Company. This bulletin, No. 10, is a revision of the Kellogg company's bulletin, No. 90. It contains all the new circuits in colors modeled after the Kellogg magneto switchboard colored circuits which have proved so very popular. It illustrates and describes the Kellogg magneto switchboards, from the 50-line to the 320-line cabinet, latest type of low key-shelf magneto boards, and also the 150-line and 450-line high type cabinet.

Cover of the Magneto Switchboard Bulletin.

A calculagraph section with shelf for calculagraph and standard pigeon holes mounted in the face of cabinet, built uniform with the Kellogg Code No. 12053, 150-line cabinet, as illustrated. Line drawings and face equipment give the purchaser exact information in every regard.

The keys, combined drops and jacks, plugs, cords, etc., which go into the making of the magneto switchboards, are illustrated and described in detail.

To cover illustration of this bulletin shows a reproduction of an up-to-date Kellogg magneto switchboard of the 160 line cabinet type, equipped with suspended type transmitter and standard head receiver and band, and shows how this switchboard actually looks.

The bulletin is very finely illustrated and printed and should prove of value to every telephone man. Copies will gladly be furnished any one upon request to the Kellogg Switchboard & Supply Co., Chicago.

We are in receipt of the Stromberg-Carlson Telephone Manufacturing Company's Bulletin 1022, "No. 896 Wall Telephone Instruction Book," Bulletin 1024, "Local Battery Telephones," and the new price sheets.

Federal Protection

By F. B. MacKinnon.

Below is the text of the so called Sabotage law, the act of Congress which became a law April 20, providing penalties for interfering with the conduct of the war by destroying or attempting to destroy any telephone plant, poles, wires and fixtures and buildings used in supplying facilities of communication to the military or naval forces of the United States:

An Act to punish the willful injury or destruction of war material, or of war premises or utilities used in connection with war material, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That the words "war material," as used herein, shall include arms, armament, ammunition, livestock, stores of clothing, food, foodstuffs, or fuel; and shall also include supplies, munitions, and all other articles of whatever description, and any part or ingredient thereof, intended for, adapted to, or suitable for the use of the United States, or any associate nation, in connection with the conduct of the war.

The words "war premises," as used herein, shall include all buildings, grounds, mines, or other places wherein such war material is being produced, manufactured, repaired, stored, mined, extracted, distributed, loaded, unloaded or transported, together with all machinery and appliances therein contained; and all forts, arsenals, navy yards, camps, prisons, or other military or naval stations of the United States, or any associate nation.

The words "war utilities," as used herein, shall include all railroads, railways, electric lines, roads of whatever description, railroad or railway fixture, canal, lock, dam, wharf, pier, dock, bridge, building, structure, engine machine, mechanical contrivance, car, vehicle, boat, or aircraft, or any other means of transportation whatsoever, whereon or whereby such war material or any troops of the United States, or of any associate nation, are being or may be transported either within the limits of the United States or upon the high seas; and all dams, reservoirs, aqueducts, water and gas mains and pipes, structures and buildings, whereby or in connection with which water or gas is being furnished, or may be furnished, to any war premises or to the military or naval forces of the United States, or any associate nation, and all electric light and power, steam or pneumatic power, telephone and telegraph plants, poles, wires, and fixtures and wireless stations, and the buildings connected with the maintenance and operation thereof used to supply water, light, heat, power, or facilities of communication to any war premises or to the military or naval forces of the United States, or any associate nation.

The words "United States" shall include the Canal Zone and all territory and waters, continental and insular, subject to the jurisdiction of the United States.

The words "associate nation," as used in this Act, shall be deemed to mean any nation at war with any nation with which the United States is at war.

Sec. 2. That when the United States is at war, whoever, with intent to injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, or whoever, with reason to believe that his act may injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, shall wilfully injure or destroy, or shall attempt to so injure or destroy, any war material, war premises, or war utilities, as herein defined, shall, upon conviction thereof, be fined not more than $10,000 or imprisoned not more than thirty years, or both.

Sec. 3. That when the United States is at war, whoever, with intent to injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, or whoever, with reason to believe that his act may injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, shall willfully make or cause to be made in a defective manner, or attempt to make or cause to be made in a defective manner, any war material, as herein defined, or any tool, implement, machine, utensil, or receptacle used or employed in making, producing, manufacturing, or repairing any such war material, as herein defined, shall, upon conviction thereof, be fined not more than $10,000 or imprisoned not more than thirty years, or both.

Approved April 20, 1918.

This law is a very broad one and protects all "war material," "war premises" and "war utilities." Among the "war utilities" are the telephone and telegraph systems of the country. The duty of enforcing this law rests with the Department of Justice. Complaints of violations of it are to be made to the United States district attorney of the district in which the violation occurs.

At this time when all the industrial, commercial, and agricultural forces of the nation are employed in aiding the military and naval forces of the United States there are few if any telephone lines, plants, etc., that are not being utilized in furnishing facilities for communication in aid of these forces. Therefore practically every telephone plant in its entirety is protected by this law. Managers of telephone plants should promptly report to the United States district attorney all willful interference with telephone service. The district attorneys should not be burdened with trivial complaints but where actual interference and destruction takes place it is the duty of a responsible official of your company to report the same.

NONESSENTIAL MUNICIPAL IMPROVEMENTS.

Many of our companies are being required by city and county authorities to make changes in pole lines, conduits, etc., necessitated by municipal work. To meet these requirements at this time is a very great burden on these companies. The following resolution of the Council of National Defense is therefore of great importance to all telephone companies:

Whereas plans are now being considered by certain states, counties, cities and towns for the construction of public buildings and other improvements which will not contribute toward winning the War; and

Whereas the carrying forward of these activities will involve the utilization of labor and materials and capital urgently required for war purposes;

Now therefore, be it Resolved by the War Industries Board that in the public interest, all new undertakings not essential to and not contributing either directly or indirectly toward winning the war, which involve the utilization of labor, material and capital required in the production, supply or distribution of direct or indirect war needs, will be discouraged, notwithtstanding they may be of local importance and of a character which should in normal times meet with every encouragement.

Be it further Resolved that in fairness to those interested therein, notice is hereby given that this Board will withhold from such projects priority assistance, without which new construction of the character mentioned will frequently be found impracticable, and that this notice shall be given wide publicity, that all parties interested in such undertakings may be fully apprised of the difficulties and delays to which they will be subjected and embark upon them at their peril.

Peoria Not to Appeal

The telephone rate case of Peoria, Ill., vs. the Central Union Telephone Company will not be prosecuted to an appeal in the Sangamon county circuit court, according to announcement made in the city council meeting. Corporation Counselor Radley informed the council the time for appeal expired May 17, but declined to recommend appeal. He criticised the commission roundly, however, for the decision and declared it was not satisfactory either to the city which brought the action or to the defendant telephone company.

"It is a very poor time to secure a reduction of rates," Radley said in explanation. "There is too much unrest and too much howl for increased rates."

He took occasion also to score the commission for its recent ruling forbidding extension of electric light service in Peoria and declared the order was "doing the City of Peoria a vast amount of harm."

The M. W. Dutton Company, Providence, R. I., has published a new edition of its twenty-five-cent book, "Soldering Kinks,"—bigger, better and more profusely illustrated than ever.

Independent Managers Meet in November

The annual Illinois meeting of the Independent Telephone Managers' Association will be held in Peoria November 5, 6, and 7, according to a statement from S. B. Price, manager of the convention bureau of the Peoria Association of Commerce, who was in Springfield in attendance at the board meeting of the association. Between 300 and 500 delegates will come to the annual state meeting.

The Telephone in Cuba

The Cuban Telephone Company, operating 25,919 telephones, and with 1,650 miles of long distance toll lines, covering the entire republic and connecting 239 cities and towns, and 80 sugar mills, reduced its operating expenses $92,000 during 1917 under those of 1916 and added 3,000 stations to its service.

"The net income for the year was $692,172.45, as against $438,305.15 for 1916, or a gain of $253,867.30, which gain exceeded the entire increase in gross revenue by about $12,300. In other words, the gain in gross revenue was accompanied by an actual decrease in cost of operation of $12,300 instead of the usual proportionate increase that is ordinarily to be expected. Says President Hernand Behn in his annual report to the stockholders, published April 10.

"Of the 25,919 telephones in operation on December 31, 1917, 22,489 instruments, or 85 per cent, were of the automatic type. During 1917 the average number of stations in service increased 14 per cent, the gain in automatics being 1,879. Havana, with 18,553 phones is the largest Automatic exchange, the others being Santiago de Cuba, 1096; Cienfuegos, 1050; Mantangas, 947; Cardenas, 679, and Sagna, 457.

"Despite the growth of the system during the year, the number of permanent employees was reduced by 9. In 1916 there were less than 35 telephones per employe; in 1917 this ratio had dropped to 40 to one.

"The total operating expenses of the system was $92,866 less in 1917 than in 1916, a decrease of 13.7 per cent. Computed on the per station basis, the reduction was just under 24 per cent, so that there was a gain in net income per telephone of over 33 per cent as compared with 1916."

This is President Behn's first year with the company, he having succeeded his brother, Major Sosthenes Behn, Signal Corps, U. S. R., who is now serving with the American Expeditionary Forces in France.

The following paragraphs taken from President Behn's report show part of the activities of the company during 1917:

"Within the year, 167 kilometers of long distance copper circuits were strung and 81 kilometers of phantom circuit installed.

"Fifteen additional sugar centrals were connected, making a total of 80.

"The new Automatic Exchange Building at Marianao, with a present capacity of 500 lines, was completed and 1,466 duct meters of underground conduit have been constructed."

In closing his report, President Behn says:

"It affords me much pleasure to commend the loyalty and efficiency of the staff and employees during the past year and to signify, although with hesitation because of my close relationship, my full recognition of the work initiated by my predecessor, Major Sosthenes Behn, Signal Corps, U. S. R., now serving with the American Expeditionary Forces in France, to whose individual efforts and foresight in the reorganization of the service in all its branches, the present highly satisfactory results are principally due.

"Delicacy permits only this acknowledgment on my part, which, were he a stranger to me, I should have felt it my duty to refer to more fully."

Plot of the System of Lines Operated by the Cuban Telephone Company, December, 1917.

FOUR-YEAR SUMMARY OF CUBAN TELEPHONE COMPANY'S OPERATORS.

	1914	1915	1916	1917
Average telephones in service	16,808	18,847	21,764	24,785
Gross income	$1,203,022	$1,375,902	$1,634,760	$1,876,335
Operating expenses	539,682	559,103	669,898	577,032
Decrease in operating expense (per station)	.....	0.32	1.01	7.50
Increase in net income (per station)	.....	4.53	1.60	7.78

Automatic Exhibit and Conference at National Convention

With the rapid approach of the date set for the National Convention come thoughts of the exhibits to be displayed. The Automatic Electric Company is planning an exhibit exceptionally appropriate and interesting at this time.

The new C. A. X. (community automatic exchange)

which has been extensively used as the solution of the problems of the exchange operating satellite exchanges, will be shown in complete operation and interconnected with a standard P. A. X., a cordless P. B. X. board and a long distance automatic equipment exhibit.

On June 27 and 28, the regular annual conference of automatic operating men will be held at the Automatic Electric Company's factory.

Invitation is extended to every automatic operating unit to attend the meetings, and a large representation is expected, as there has never been a time when so many vital problems have faced the telephone industry.

On Thursday afternoon, June 27, the managers' section will meet at the executive offices of the Automatic Electric Company for the discussion of the problems of finance, labor and public relations.

Friday morning a general session will be held at the same place, and various topics having to do with the operation of automatic exchanges will be taken up.

The entertainment committee promises "something doing" and assures the delegates a mighty good time.

As usual, rooms 1708-9-10 at the Hotel La Salle will house the automatic exhibit and will be the gathering place for automatic men and those interested in automatic equipment. Every one is extended a most cordial invitation to visit the automatic exhibit and factory while in Chicago.

Stromberg Telephones Equipped with New Arrester

Every telephone man, who has "shot" trouble on rural lines, knows what annoyance to subscribers and expenditure of the telephone company's time and money can

The New S. C. Arrester.

be caused by "dirty" arrester carbons. In some sections subject to severe electrical storms it is often necessary to send a man over all the lines to clear out the accumulation of carbon particles in the arresters before adequate service can be restored.

The Stromberg-Carlson Telephone Manufacturing Company is now equipping its rural line instruments with a new type of arrester which is said to eliminate the objectionable features of the telephone arrester now in use. It is a carbon block arrester in which the perforated dielectric disc in the air-gap is attached to the metal cover, so that when the cover is turned the dielectric disc turns with it and cleans out any possible accumulation of dislodged carbon particles which might make the line noisy. The simple operation of turning the arrester cover, once or twice, restores the service on the line to its normal condition without the necessity of taking the device apart.

Subscribers at stations equipped with telephones having this new feature can restore service after thunderstorms without help from the company's inspectors, thus saving annoyance from noisy lines and the time and expense caused by extra inspection trips over the line.

Detailed information regarding this new device will be furnished upon request by any office of the Stromberg-Carlson Telephone Manufacturing Company.

Lima, Ohio, District Meeting

Lima, Ohio, welcomed on May 2 the annual district meeting of the Ohio Independent Telephone Association. The morning was taken up with business sessions at the Elks' home and at noon a luncheon was served the visitors.

Frank L. Beam of Mt. Vernon, president of the association, presided over the meeting and read the annual report. Mr. Beam asserted that while there are more telephones than ever before, the operating companies have been compelled to fill their lines to the limit in many towns and cities without making proper provisions for future growth and development.

The state, Mr. Beam says, after having passed through the 1917 coal famine and being now in the midst of a wheat flour famine, is also confronted with a telephone shortage. Exhaustion, he said, of the remaining telephone facilities will have to mark time until further capital and higher rates may be obtained.

In the annual report Mr. Beam advocated higher telephone rates in localities where independent telephone companies are unable to make ends meet on their present income. He said: "Failure to maintain companies in healthy financial condition at this time constitutes a betrayal of the country. The government is depending upon public utilities in handling its business to an unbelievable extent, and a breakdown in service, while this condition continues, spells disaster that cannot be measured in dollars and cents. It is more necessary that your charges be sufficient to care for proper operation, maintenance and construction and in every case where they fall short they should be increased to the proper point. Your rates must be fair, not only to the public you serve, but to the company as well."

D. J. Cable, prominent attorney of Lima, who is interested in the local telephone company, welcomed the visitors to the city. Judge E. B. Fisher, of Grand Rapids, Michigan, chairman of the board of directors of the United States Independent Telephone Association, delivered a very appropriate talk to the gathering.

F. L. McKinney, of Columbus, sales representative of the Ohio State Telephone Company, gave a talk on the commercial side of the business. It was shown during a general discussion that practically every telephone employe throughout the state is now financially interested in this war.

Collection of War Tax on Messages

By F. B. MACKINNON.

A number of inquiries have been received from member companies relative to the collection and reporting of the tax on telegraph-telephone messages. These inquiries show differences of interpretation of the instructions of the Commissioner of Internal Revenue in regard to the tax on telegrams. It was thought best, therefore, to submit the matter to the commissioner for a further opinion. In reply to the association's letter the following statement has been received:

Receipt is acknowledged of your letter of May 7, relative to the collection and reporting of the war tax on telephone and telegraph messages.

A statement of the cases cited in your letter, together with the opinion of this office in connection therewith, is made as follows:

1. "It is the common practice for telegrams to be filed with telephone companies who in turn use their toll lines to reach the office of the telegraph company and transmit to the telegraph company the messages filed, which messages are then transmitted to their destination by the telegraph company. In this case the sender of the message pays for a telegram from the office of the telephone company to the point of destination, there being but one charge and the sender not being concerned in what use is made of telephone lines in transmitting the message."

In these cases where the message is strictly a telegraph message, and the telephone company, acting as agent of the telegraph company, collects the total charges on the complete service in connection with the transmission of the message from origin to destination, it is held that the telephone company shall collect the tax applying to such total charges, as and when the charges are paid, and such charges and tax shall be turned over to and reported by the telegraph company.

2. "In some cases, however, the sender of the message asks the telephone company to connect him by their toll line with the nearest office of the telegraph company and when such connection has been established dictates to the telegraph company a message to be delivered to some distant point."

In these cases, there are two charges involved, the telegraph message and the telephone toll message, and a tax must be collected on each message. The telephone company collects its own toll charge, and also, acting as agent of the telegraph company, collects the charge of the telegraph company. The telephone company collecting the total amount of these two charges shall collect the tax applying to said charges, as and when such charges are paid, and the charges and tax applying to the telegraph message shall be turned over to and reported by the telegraph company, and the charge and tax applying to the telephone toll message shall be included in the report of the telephone company.

3. "The procedure in this case is: a telegram is sent from (A) to be delivered to some individual at (C). The telegram is received by the telegraph company's agent at (B), which is the nearest telegraph office to (C), who puts in a toll call for the individual at (C), for whom the telegram is intended. In this case the sender of the message as (A) pays for a telegram addressed to (C) and the telegraph company makes use of a toll message in delivering the telegram. Should the sender of the message pay the tax twice, once on the telegram and once on the toll message? In these instances we are assuming that the regular toll charge is for 15c or over."

In this instance the message is strictly a telegraph message, and this case is similar to the first case cited by you. In this case, the telephone company, acting as agent of the telegraph company, renders its service in connection with the delivery of the message; in your first case, such service is rendered in connection with the receipt or origin of the message. The telegraph company acting as principal in this transaction, and collecting the total charges on the complete services rendered in connection with the transmission of this telegraph message from (A) to (C), shall collect and report the tax applying to such total charges, as and when such charges are paid, and the tax on the telephone toll message would not be included in the report of the telephone company, which acted as agent of the telegraph company.—B. C. KEITH, *Deputy Commissioner.*

This statement has the force of a ruling and the instructions contained in it should be followed by all telephone companies. If all disputed procedure is not covered by this letter we will appreciate further statements from member companies.

Loans to Utilities

A statement issued May 23, 1918, by the War Finance Corporation says:

"The directors of the War Finance Corporation have under consideration applications from many public service corporations doing business in various sections of the country, for loans aggregating a large amount. From the more or less superficial examination of these applications which the directors have been able to make since their induction into office, it is evident that the expense of operation of these utilities, due mainly to higher cost of labor and materials has increased to such an extent as to render imperative in many cases a substantial advance in rates for service.

"The directors of the War Finance Corporation do not feel that they have any authority under the law to make loans except upon adequate security as required by the act, and they are convinced that the inability of a utility company to earn a sum at least sufficient to pay its fixed charges, taxes, maintenance and repairs, is conclusive evidence of the inadequacy of its own obligations as security. The directors of the corporation feel that the localities served by these various public utility enterprises should be willing to sustain them and that the War Finance Corporation should not be expected to make advances to any utility company whose statement shows that it is in actual need of increased revenue, unless the local authorities shall first have granted an increase in rates sufficient to maintain the enterprise as a going concern. It is urged, therefore, that the proper authorities give prompt consideration to applications made by public utilities for permission to increase rates. Failure to grant a reasonable increase will, in many cases, result in receiverships, demoralization of organization, and less efficient service, with the possibility, under operation by the courts, of higher rates than are now asked for."

The officers of the War Finance Corporation are Secretary of the Treasury McAdoo, chairman; William P. G. Harding of the Federal Reserve Board, vice-chairman and general manager, and Clifford M. Leonard, Eugene Meyer, Jr., and Augus W. McLean, directors.

The members of the Capital Issues Committee are Charles S. Hamlin, chairman; John Skelton Williams, Frederic A. Delano, James B. Brown, John S. Drum, Henry C. Flower and F. H. Graff.

The War Finance Corporation directors and members of the Capital Issues Committee are appointed by the President.

It is expected that a formal statement will soon be issued relative to the procedure to be followed in applying to the committee for approval of issues of securities and to the Corporation for loans. The statement published above is the first issued since the organization of the two bodies May 17.

Merger in Wabash

A deal was consummated May 3 which will be of material aid to the users of the long distance telephones in the district when the Home Telephone Company of Wabash, Ind., took over the toll service and entire city service of the Bell company there and hereafter will handle all long distance telephone calls out of the city. While the final papers were signed up when officials of both companies met, the change will not likely be made before the first of July. The Bell company will begin to dismantle its office at once and the toll will be connected in the Home office.

Government Wants Business Diplomats

The government is looking for big caliber men with foreign trade experience to serve as commercial attaches for the Bureau of Foreign and Domestic Commerce, Department of Commerce, and announces that appointees will be accredited to American embassies or legations abroad and will be expected to meet in a creditable manner the most important government officials and business men in such countries and make trade reports.

The appointments will be made in pursuance of the Department's plan to prepare now for the competition in foreign trade that will come as soon as the war is over, and because the work is so vitally important to the future of American trade only men of undoubted qualifications will be considered.

A written examination will be held on June 6, and those interested are urged to write at once to the Bureau of Foreign and Domestic Commerce, Washington, for further details.

Applicants admitted to the examination will be required to write a thesis on some given foreign trade subject and answer difficult and searching questions on economic and commercial geography and transportation, current events in foreign countries, the industrial development of the United States in its relation to export, and to know well at least one foreign language. Education and foreign trade experience will be important factors, and those most successful in passing the written examination will later be given an oral test before a board in Washington.

The salary of commercial attaches ranges from $4,000 upward, and there are transportation and other allowances. The Department of Commerce is also planning to appoint trade commissioners to Europe, South Africa, and the Far East in the near future, and appointments may be made from those who successfully pass the attache examination without receiving assignments.

McMeen & Miller Firm Dissolved

The corporation McMeen & Miller, doing business as engineers at 1454 Monadnock building, Chicago, and well known to all telephone men, has been dissolved. War conditions are given as the reason for the action.

Samuel G. Meen, the senior member, who retired as president of the Ohio State Telephone Company some time ago, gives up his connection with the engineering firm on account of ill health.

Leigh S. Keith, treasurer of the corporation, has been commissioned a major in the United States Reserves, and is now in Washington on duty.

It is probable that Kempster B. Miller will continue in practice at the old address, but no announcement has yet been made.

Through the Kellogg Plant

Fred W. Schwamb, one of the owners of Telephone Engineer, in a recent trip through the big Chicago plant of the Kellogg Swltchboard and Supply Company, was honored by having as his guide President J. B. Edwards of the company. Mr. Schwamb was impressed not only by the immensity and activity of the Independent factory, but also by the remarkable grasp of technical detail evinced by his host. Evidently, he says, the president of a large corporation can still be a regular telephone man.

Western Pennsylvania Meeting

A general discussion as to the necessity of increasing rates and the probability of opposition which the increase would cause was held at the thirty-eighth quarterly meeting of the Western Pennsylvania Independent Telephone Association in the Fort Pitt Hotel at Pittsburgh, April 26.

J. C. Bousch, general commercial superintendent of the Ohio State Telephone Company, Columbus, O., gave a short talk on the manner in which the announcement of an increase in rates was accepted by the cities of Ohio. Three $100 Liberty bonds of the third issue were ordered to be bought by the association upon motion of W. H. Wilson, general manager of the Union Telephone Company of Erie, Fred J. Heavens, president of the association, presided.

Capt. C. P. Hill, recently returned from France, said American telephone service on the battle fronts is superior to that of the French.

The necessity for higher telephone rates and approaching exhaustion of telephone facilities were among the things discussed at the meeting. Reports showed that there are more than three times as many telephones in use in Pennsylvania today than were in service throughout the United States in 1895.

Many members reported that high prices for all classes of materials and the prevailing scarcity of competent labor had compelled them to abandon plans for new construction. Due to this condition association officials fear that a general telephone shortage may soon be brought about, due to the increased demand for telephone service with development temporarily at a standstill.

A closer co-operation between the residents in our cities and the surrounding farms has been noticed by telephone men during the last few months, apparently a result of the government conservation program. Farmers in certain localities have established regular telephone lists of residence customers, obtaining produce orders by long distance and forwarding the articles sold by parcel post.

Form Texas Signal Corps

The board of directors of the Texas Independent Telephone Association, meeting in Dallas, authorized the officers of the association to offer their assistance to Brigadier General R. H. McDill in organizing a Signal Service Corps for his brigade of the new Texas National Guard. General McDill was quoted as saying he would like to have the telephone men undertake the work, which is similar to that they did for the War Department some months ago.

It was also decided to hold six district meetings during the year, places to be decided on later. The secretary's office was authorized to send out monthly bulletins to the members, giving information concerning the telephone business and news items pertaining to it.

Resolutions were passed in respect to the memory of J. J. Ozment, president of the Palestine Telephone Company and a director in the association, who died recently.

Those attending the meeting were R. B. Still, Tyler, president; E. C. Blomeyer, Waco, secretary; E. M. Powell, Dallas, treasurer; J. Y. Rust, San Angelo; C. D. Longserre, Bardwell; J. A. Smith, Fort Worth, and John A. Stratton, Dallas.

Kansas City Mayor Wants Merger

Mayor Cowgill of Kansas City, Mo., has sent a communication to the city council requesting a committee of six members be appointed to investigate the question of merging the two telephone systems in Kansas City.

The communication was accepted without discussion. Named on the committee are W. E. Sullivan, E. E. Harrington, George Harrington, J. P. O'Neill Edward J. McDonnell and Harry Sandler.

Mayor Cowgill said in his communication there was "urgent need of universal telephone service" in Kansas City and urged the council to take steps to bring about "proper and fair relief."

The mayor's communication:

I desire to call your attention to the fact that the people of our city have, by their vote in the last city election, expressly indorsed the proposition of a single telephone system, in that a plank in the Democratic platform contained a pledge to work to that end.

We now have a dual system of telephones which has been in use here many years, and which, in my judgment, has fully accomplished its purpose. There appears to me to be at the present time, when conservation is so imperative, the urgent need of universal telephone service in our city, which can only be obtained by a single telephone service.

The dual system is not only intolerably inconvenient, but it is more expensive to our people, resulting in a double charge for telephone service to thousands of telephone users.

I, therefore, recommend to you, Gentlemen of the Common Council, to the end that action may be taken in this matter without delay, that you appoint a joint committee, composed of three members from each house, to consider the question of merging the telephone systems of the city and to take such steps as may be necessary to accomplish this end to bring about proper and fair relief in our telephone situation.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

M. R. Stanwell, who for several years has been manager of the Osceola, Iowa, office of the Bell Telephone Company, resigned recently. He will be succeeded by C. H. McCoy, recently manager at Lorimer.

William W. Haus has retired from the La Porte Telephone Company, where he has been employed for 16 years.

Manager J. T. Knode, for some years connected with the C. V. Telephone Company, and more recently in charge of the Hagerstown, Pa., branch of the organization, has resigned. Mr. Knode will look after the coal and coke interests of his son, Major Ralph Knode, who goes to Europe on important duties for the fuel commission. He will be succeeded by F. B. Troupe of Carlisle.

The Board of the Citizens Telephone Company, of Grand Rapids, Mich., elected Claud T. Hamilton a director to succeed Gaius W. Perkins, resigned.

In the presence of more than 1,000 Scientists, Col. John J. Carty of the United States army signal corps and chief engineer of the American Telephone & Telegraph Company was awarded the Edison medal in recognition of his work in developing telephone engineering.

I. J. Marshall, formerly telephone manager of Auburn, California, is the new manager at Alameda, succeeding Harry C. Brownlee who resigned on account of ill health.

E. C. Bradley, president of the Pacific Telephone and Telegraph Company of Berkeley, California, a dollar-a-year-man under Secretary Lane in Washington, has accepted an appointment to the Harbor Planning Commission.

James M. Harris, who for several years has been cashier for the Southern Bell Telephone and Telegraph Company at Rome, Georgia, has been promoted to the position of manager, left vacant by the transfer of H. R. McClatchey to Columbus, Georgia.

NEWS FROM THE FIELD.

COLORADO.

A mutual telephone company has been organized at Coal Creek, near Meeker.

FLORIDA.

Dr. P. W. Butler of Leesburg has sold the telephone company of that city to Otto Wettstein, Jr., of Justus, who is owner of the Lake County Telephone Company.

ILLINOIS.

The Bible Grove Mutual Telephone Company of Bible Grove has been incorporated with a capital of $5,000 by E. L. Sunderman, Alfred Sprecht and E. J. Hall.

Byron Collins, for the past two years manager of the Urbana office of the Automatic Telephone Company, has been placed in charge of a telephone exchange at Phoenix, Ariz., and reported there for duty May 15.

The Farmington Telephone Company of Canton has changed hands. The new owner is Perry Anderson of Canton.

The Home Telephone Company of Bluffs has been incorporated at Bluffs with a capital stock of $5,000, by George W. Van Qundy, William Loewe and George M. Burrus.

INDIANA.

The transfer of the Home Telephone system of Kendallville to the Central Union Telephone Company has been made and both systems are now being operated and managed by A. R. Otis who has been manager of the Bell lines.

Captain A. P. Andrew was elected a director of the La Porte Telephone Company at a recent stockholders' meeting, and at a meeting of the directors J. Vene Dorland was elected president succeeding W. W. Haus who resigned.

The Home Telephone Company of Wabash has bought the franchise of the Bell Telephone Company there and will take over the toll lines as soon as they can be transferred.

IOWA.

At a meeting held by the stockholders of the several rural telephone lines out of Terril, it was voted upon and decided to incorporate all the lines into one company known as the Terril Telephone Company. The new organization starts out with the following officers which were elected at their meeting: President, David Woods; Vice president, Frank Kreiger; Treasurer and manager, R. H. Green; Secretary, Francis Johnson; Board of directors, H. A. Blum, O. Wittchen, Gus Below, O. T. Ellis, and Chas. Maas.

At the meeting of the New Era Telephone Company at Hebron all the officers were re-elected for the ensuing year.

At a most enthusiastic meeting attended by several hundred farmers and townspeople of Mt. Pleasant, officers were elected and arrangements made to file articles of incorporation of the Henry County Cooperative Telephone Company. Officers were elected as follows: President, M. C. Wilson; vice-president, John Kopp; secretary, Walter Rukgarber; treasurer, W. E. Young.

Directors: The officers and Guy Huntington, Osbert Ollander, August Wick, Clint Young, A. B. Holley and C. B. Cornaham. The organizing of the new company is the outgrowth of the war over the increase in telephone rates proposed by the other company.

Judge S. M. Elwood has sold the telephone property of the Elwood Telephone Company in Sac county, including the exchange system in Sac City and the farm lines the company has constructed and operated in the county, to State Senator P. C. Holdoegel of Rockwell City, who is manager of the Calhoun County Telephone Company. The transfer is effective on June 1, 1918, with the proviso that the property is to revert to Judge Elwood in case he does not obtain a new franchise, the present franchise of the company expiring a year from next November.

The German Telephone Company of Dillon, near Marshalltown, has changed the name of the company to the Dillon Farmers' Company.

The Silver Creek Telephone Company of Waukon has been incorporated with a capital stock of $2,500, by J. J. Deery and J. J. Murphey.

KANSAS.

The United Telephone Company of Abilene has increased its capital from $1,500,000 to $2,000,000.

The Cheyenne Telephone Company of Redwing has increased its capital from $15,000 to $30,000.

At Plainville's annual telephone meeting H. L. Adams was elected president for the term of one year, J. B. Romine for vice-president; M. F. Fritts, treasurer; E. N. Sidwell, secretary; W. V. Doak, trustee for three years.

The United Telephone Company at Plainville has purchased the Webster central and arrangements are being made for the telephone lines in that vicinity to central at Stockton.

The Cheyenne Telephone Company of Red Wing has increased its capital from $15,000 to $30,000.

The United Rig & Reel Company of Tulsa has increased its capital from $1,500,000 to $2,000,000.

KENTUCKY.

E. Cody Thomas, auditor of the Christian-Todd Telephone Company at Hopkinsville, has been given a substantial promotion and will be located in Evansville, Ind., as auditor of the Southern Telephone Company of Indiana. He will be succeeded at Hopkinsville by J. P. Warren, of Evansville.

The Linton Telephone Company of Linton has been incorporated with a capital of $3,000 by R. L. Nunn, C. T. Nunn and William Blackford.

The Cerulean Springs Telephone Company of Cerulean has been incorporated by J. L. Blakeley, Alex Wallace and John S. White with a capital of $1,000.

LOUISIANA.

As soon as the material can be assembled, which, however will probably not be effected until next year, the Cumberland Telephone Company will let the contract for a four-story brick building to house its growing business in Shreveport.

MINNESOTA.

On Saturday, March 16, a number of the farmer residents of the southern portion of the county gathered at Odessa, for the purpose of organizing a rural telephone association, at which time an organization to be known as The Trail Cooperative Rural Telephone Association was perfected. The following officers were elected: A. C. Woodard, President; D. S. Cheadle, Vice President; A. Hovde, Secretary; K. R. Long, Secretary; Directors—Wm. May, Jr., Alfred Hovde, Gus. Henkelman, J. O. Melby.

At the annual meeting of the Tri-State Telephone and Telegraph Company at Minneapolis G. W. Robinson was re-elected president, as also were J. H. Lockhart and E. P. Wells, vice presidents, and C. B. Randall, secretary.

At the annual business meeting of the stockholders of the Midland Telephone Company at Adrian the board of directors consisting of C. M. Smallwood, W. R. Mansel and Edwin Brickson was re-elected.

L. A. Mills of Minot, North Dakota, has accepted the position of superintendent of the Nicollet County Telephone company at St. Peter, made vacant by the resignation of H. A. Seybold, and takes charge May 1.

The Oak Lawn Telephone Company held its annual meeting recently and elected officers, all being re-elected except the director. The officers are, president, Joseph Vanek; secretary, August Nelson; treasurer, Dick Sagli and director, David Sandberg.

MONTANA.

The telephone office at Saco was destroyed by fire recently. The loss has not been estimated.

Manager Johnston of the Lewiston telephone exchange has resigned and will be succeeded by C. E. Farwell.

NEW YORK.

The New York Telephone Company has increased its capital stock by $25,000,000.

At the annual meeting of the American Telephone & Telegraph Company, George D. Milne, treasurer, was elected a director. Retiring directors were re-elected.

The American Telephone and Telegraph company has listed on the Boston stock exchange $6,000,000 additional capital stock. This brings the total amount of stock outstanding, together with the $425,100,000 not yet fully paid, to $442,185,800.

NORTH CAROLINA.

Carlton Best, of the Charlotte office of the American Telephone & Telegraph Company, has been made cashier of the company for the thirty-third district, embracing North and South Carolina.

The Wellston Iron Furnace Company is constructing a private telephone line between Oak Hill and Superior, O., to connect with the Jackson County Home Telephone Company.

OHIO.

The interests of the Central District Telephone Company at Salem have been merged with those of the West Virginia branch of the Bell Telephone Company. Frank Swaney is the manager of the combined company.

A new and greatly improved long distance switchboard has been installed at Delta. The long distance calls can now be handled with much greater efficiency.

Harley E. Stearns of California avenue, Lorain, has resigned his position as line foreman at the Black River Telephone Company to accept one in the electrical department at the American Shipbuilding Company.

The Logan Home Telephone Company of Logan will take over the Bell Telephone Company of that city, the change to go into effect about July 1.

The Farmers' Telephone system at Cumberland has been consolidated with the Independent system of which Harley McKee is manager.

The Eastern Ohio Telephone Company, with offices of the company at East Rochester, has sold its lines and holdings to the Winona, North Georgetown and Paris Farmers' and Merchants' Companies. By the provisions of the sale the Winona company acquires the lines and holdings of the Hanoverton Central exchange, the North Georgetown company, the lines and holdings of the Homeworth exchange and the Paris company, the lines and holdings of the exchanges at East Rochester and Minerva.

OKLAHOMA.

The German-American Telephone Company of Orlando wishes to announce that it is not even half German. It is now the Orlando Telephone Company.

The Hooker Southern Telephone Company of Hooker has been incorporated with a capital of $1,500 by H. U. Kelly, W. T. Kirk and J. C. Burke.

The South Cobb Telephone Company has been incorporated by J. J. Fielding, O. S. Beck and R. C. Heacock with a capital of $400.

PENNSYLVANIA.

The American Telegraph and Telephone Company is engaged in the construction of a conduit which starts at Newtown Square and will eventually extend to Reading.

At a meeting of the stockholders of the Cumberland Valley Telephone Company at Harrisburg the following officers were elected; President, William J. Lescure; vice-president, Charles A. Kunkel; chairman of the board of directors, S. W. Ffoulkes; secretary and treasurer, O. K Kines, and general manager, Cameron L. Baer. The following were elected on the board of directors: William J. Lescure, Charles A. Kunkel, S. W. Ffoulkes, Frank A. Zimmerman, W. Grant Rauch, Christian L. Long, S. W. Shunkwiler, James K. Trimble and A. E. Pendergast.

The P. & R. C. & I. C. have a force of men at work in Pottsville running a cable line through the streets for the purpose of installing a telephone exchange in the Brobst building, where the office of the company is located.

The Bell Telephone Company is preparing to start work in May on additional lines from Connellsville to Pittsburgh and to West Newton. In addition, new lines will run from Connellsville to Dawson, Greensburg and Dunbar. The work will be completed in August.

The Petroleum Telephone Company of Titusville announces that it will sell a limited amount of its stock to its patrons, the object being apparently to secure a wider distribution of its securities among those who make use of its lines.

SOUTH CAROLINA.

The Cope Telephone Company, of Cope, was chartered, with a capital of $2,000. The officers are A. J. Thomas, president; W. H. Zeigler, vice president; E. E. Ritter, secretary and treasurer.

SOUTH DAKOTA.

The Western Telephone Company of Edmunds County has been incorporated at Hosmer with a capital of $12,000. Incorporators are: Adam Reinboldt, John Henitzman and Balthason Giles.

Articles of incorporation have been filed for the Newell and Northwestern Telephone Company, at Newell, with a capital of $1,250. Incorporators, M. E. Kiser, W. P. Martin, S. H. Bober.

TEXAS.

W. A. Black, who has been manager of the Southwestern Telegraph and Telephone Company at Mexia for the past three years, has been transferred to Sherman. T. M. Hart, formerly of Corsicana, succeeds Mr. Black.

Telephone connections between American and Mexican border towns are being suspended for the period of the war, it is officially announced. This action is being taken voluntarily by the telephone companies operating in the American border towns and is being done to prevent information regarding American military preparations reaching German agents in Mexico.

UTAH.

The Palmyra Telephone & Electric Light Company has been incorporated at Provo with a capital of $25,000 by L. P. Thomas, M. Boadsgaard, Erastus Hansen, Ed. M. Thomas and P. P. Thomas.

VIRGINIA.

The Maybrook Mutual Telephone Company of Maybrook has been incorporated with a capital stock of $10,000 by Jacob I. Williams, of Pembroke, and Elmer B. Stiff of Maybrook.

At the annual meeting of the stockholders of the Page Valley Telephone Company of Luray N. H. Clark was elected vice-president in place of H. J. Good, and D. L. Kauffman was re-elected secretary and treasurer. The corps of officers for the next year are as follows: D. S. Hite, president; N. H. Clark, vice-president; D. L. Kauffman, secretary and treasurer, and these three compose the board of directors with the following: H. J. Good, W. E. Coffman, W. E. Burner, W. D. Huffman, G. T. Long and Joseph A. Huffman.

WYOMING.

The Mountain States Telephone and Telegraph Company will build a new exchange at Wheatland on the former county library site.